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VIEWS, NEWS AND INTERVIEWS.

Dynamos and other electrical apparatus were purchased last week to the value of $19,500 by an export merchant in the Bowling Green Building, New York city, for early shipment to London. The people receiving the order are inclined to believe that the destination of the apparatus is a Spanish speaking country, on account of the name plates that have been ordered to be put on the largest pieces.

The other day at Newington, Ct., a young girl crossing the track of the New York & New England Railroad, where the third rail is laid, stumbled and fell in such a way that her body formed a connection between the electric rail and one of the others, and the current passed through her. She was rescued very quickly, and though severely burnt, was not killed. The New England newspapers are discussing this incident as showing the dangers of the new electric system, but the Hartford *Courant* takes an opposite view. It does not think the third rail so dangerous as the engine on the ordinary track, and, in view of the record of deaths caused by walking on the railways, it believes that if the third rail, with its mysterious current, serves to create a general fear of the track, it will be adding to its useful work for the public. The railroad track is no place to walk on. Danger is always there.

George E. Brettelle, of Lead, S. D., manager of the Rochester-Greenback Mining Company, has begun the erection of a 1,200-horse-power electric plant on Spearfish Creek, a mile below Elmore station. The erection of this plant will be followed by the establishment of various manufacturing and milling industries on Spearfish Creek, power for which will be furnished by this electric plant.

In the case of Everett vs. the Los Angeles Consolidated Electric Railway Company, the California Supreme Court holds that a person riding between the rails of an electric railway upon a bicycle is chargeable with the duty of looking out for and endeavoring to avoid danger from the electric cars; and the motorman seeing him is entitled to assume up to the last moment that the rider will turn out of the way by increasing his speed or turning aside to avoid the danger.

A few nights ago thieves cut down the feed-wire along the Staten Island Electric Company's line on Castleton avenue, New Brighton. About 500 pounds of copper wire was stolen. The thieves were arrested, and the wire was recovered in the woods, where it had been hidden by the thieves.

A proposition looking to the establishment of telegraphic communication with the Klondike gold fields has been received through the British Embassy by the United States Government from the Canadian authorities. The route suggested by them as the most practicable is that beginning at the head of Winter navigation at Lynn Canal, that being the name of the narrow body of water stretching from Juneau to Chilcoot Crossing, the mountain range at White's Pass, and thence to Klondike via Fort Selkirk. The Canadians are willing to construct the line from the canal across the range and along the trail through Fort Selkirk to the boundary line, and to maintain a system of dog trains during the Winter months for carrying the mails, with stations 40 or 50 miles apart. The papers have been referred by Secretary Sherman to the Interior Department, where they are under consideration.

A recent press dispatch from Berlin, Germany, says that, according to a communication made by the Royal Observatory, Professor Goldstein, of Berlin, has succeeded in experimentally reproducing by means of cathode rays certain very distinct and characteristic cometic phenomena, such as the radiation of light from the head of a comet and the resultant development of a tail. He has also been able by these means to account for certain peculiarities of this class of phenomena which have been observed in recent years.

Socialists in Atlanta, Ga., are clamoring for municipal ownership and operation of the street railways of that city. Their idea is that the city will save the fabulous profits of the "trolley autocrats" and that the money thus turned into the public treasury will nearly pay for ordinary improvements. Undoubtedly this scheme for abolishing taxes is very alluring, but, unfortunately, it won't work.

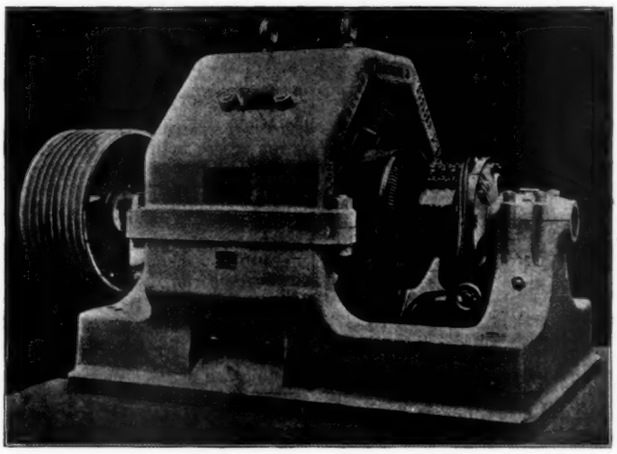


FIG. 1.—FOUR-POLE, 110-KILOWATT, CONTINUOUS-CURRENT DYNAMO, WITH SLOT-WOUND DRUM ARMATURE.

A British Dynamo with Slot-Wound Drum Armature.

About a year and a half ago Easton, Anderson & Goolden, of England, began to build dynamos and motors fitted with slot-wound armatures, after designs by their electrical engineer, Mr. V. A. Fynn. Dynamos of this type are made by this firm in sizes from three-fourth unit to 300 units, and the same pattern of armature is also being used in all continuous-current motors. From three-fourth unit to 110 units the dynamos are provided with four-pole field magnets, while above these sizes and up to 200 units six poles are provided, as many as eight poles being used for machines between 200 and 300 units in size. The field magnets are made in cast-iron, with a lower part united to the bed and with a detachable upper part, for machines up to 30 units; larger machines, up to 110 units, have cast-iron frames with cast-steel poles; and still larger machines are built in the same materials, or wholly in cast-steel, as may be desired. In all the machines the upper half of the field magnet is detachable from the lower half, and may be lifted very expeditiously, to enable the armature to be taken out without risky drawing out endwise. The armatures in these machines are in every case of the drum-wound slotted type, wound either with round copper or with rounded copper strip, according to the width of the slot and the amount of copper to be laid in it. Many of the armatures are wound with four separate round wires in each slot, while other slots contain two separate strips. The insulation of the conductors in the slots appears to be well cared for, and undoubtedly stands severe testing. The armature core is built up of sheet-iron stampings, the grooves for the binding wires (which are of brass) being formed by building in a certain number of plain, un-notched disks (of smaller diameter than the others) where the binding grooves are required. The notching of the disks, both for the peripheral conductors and for the clamping bolts, is done by means of a Bliss notching machine.

The shaft and spider, on which the armature stampings are fixed, consist of one forging, and the shape of the spider is such as to provide ample channels for ventilation, as well as to enable the clamping bolts to act also as sunk-keys. One-half of the section of the bolt is within a semi-circular groove in the spider, and the other half is within a similar groove in the stampings. Ventilation of the armature, and indeed of the whole machine, is very carefully and adequately provided; and the armatures are built for a normal temperature rise of 70 degrees to 80 degrees, while for the field coils the temperature rise is between 60 degrees and 70 degrees. These limits are well kept by machines up to 110 units in size, while for still larger machines an even lower rise in temperature occurs. It should be stated that the air-gaps in all these machines are reduced to the lowest practicable figure, thus insuring great economy in construction. In the size of machine shown in Fig. 1, the air-gap at each pole is but three-sixteenths of an inch. Notwithstanding the small air-gaps and the use of slots on the armature surface, there is no appreciable heating of the pole surfaces nor sparking at the commutator. With ordinary copper gauze brushes, the adjustment for sparklessness between no load and full load is from two degrees to five degrees, according to the size of machine; while with carbon brushes an even better result is, of course, obtainable.

Embodied in Fig. 2 will be found the results of a series of tests of two of the 110-unit machines, the tests being made by the Hopkinson method by coupling the dynamo shafts together in line. The following are also some particulars of tests which have been made on a 50-unit shunt dynamo recently exhibited at Newcastle, the general construction of this machine being on the lines shown in Fig. 1. This machine was wound for 220 amperes at 230 volts, running at 750 revolutions per minute. The bed-plate and frame were of cast-iron and the poles were of cast-steel. The weight of the machine, including the pulley, but exclusive of the slide rails, was 128 pounds per kilowatt. The air-gap was three-sixteenths of an inch at each pole. After a six hours' run at full load, the rise of temperature in the armature was 70 degrees, and in the field coils 65 degrees. With copper brushes, four degrees lead was necessary for sparkless collection. The magnetizing current represents two per cent of the full outfit, and the commercial efficiency at full load was 94.5 per cent. When the resistance of the exciting circuit was kept constant, as also the speed, a variation of the load from full to zero load caused the voltage to rise from 230 to 245 volts. We are indebted to the London *Electrician* for the above particulars, and for the illustrations which accompany this article.

The citizens of Elmore, Ohio, have voted against issuing $10,000 electric light plant bonds.

OUR CANADIAN LETTER.

BRUSSELS, ONT.—An electric light station will be built here.

EXETER, ONT.—R. G. Tremaine, of Toronto, will put in an electric light plant here.

WATERVILLE, QUE. — Steps are being taken towards lighting the village by electricity.

WOODVILLE, ONT.—Steps are being taken looking to the installation of an electric light plant.

MAGOG, QUE.—A by-law will be voted on shortly to provide funds for an electric light plant.

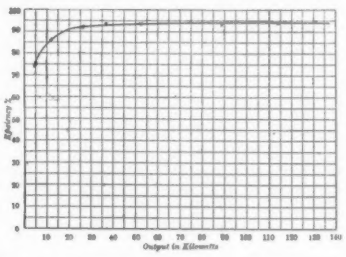


FIG. 2.—CURVE SHOWING EFFICIENCY AT VARIOUS LOADS OF THE DYNAMO ILLUSTRATED IN FIG. 1, PAGE 85.

GRAND FORKS, B. C.—Arrangements are being made by the City Council to borrow $20,000 for an electric light plant and a fire system.

VERNON, B. C.—It is expected that the waterworks and electric light by-law will be carried by the ratepayers.

LEVIS, QUE.—At the last meeting of the City Council it was decided to call for tenders for the electric lighting of the town by arc and incandescent lamps.

OTTAWA, ONT.—The Ottawa Electric Railway Company are seeking power from Parliament to borrow $500,000 to pay for extensions and improvements.

EXETER, ONT.—Local capitalists are reported to be promoting an electric railway from Grand Bend to St. Mary's. A power distribution is a part of the scheme.

NIAGARA FALLS, SOUTH, ONT.—The Town Council has granted a franchise to the Lundy's Lane Electric Railway, to run over certain streets of the town.

LONDON, ONT.—It is proposed to extend the London Street Railway beyond the asylum of the insane to Pottersburg, and also to connect the city with the town of Lucan.

TORONTO, ONT.—Alderman Woods has given notice in council that he will move to authorize the city engineer to prepare an estimate of the cost of an electric light plant to light all municipal buildings.

SHERBROOKE, QUE.—Contracts for motors and generators for the proposed electric railway have been given to the Canadian General Electric Company; for closed cars to Messrs. Rhodes, Curry & Company, Amherst, N. S., and for open cars to Messrs. Ahearn & Soper, Ottawa.

ST. THOMAS, ONT.—Negotiations are still going on between the City Council and the promoters of the proposed electric railway. The council has decided to obtain a proper estimate of the probable cost of the railway, before agreeing to give a guarantee as requested, for the bonds of the company to the amount of $50,000.

LA MALBAIE, QUE.—La Compagnie de Saint Etienne de la Malbaie applies for a Quebec charter, with a total capital stock of $5,000, headquarters in the parish at St. Etienne de la Malbaie, to exercise the industry of electricity in all its branches. The incorporators are as follows: J. Warren, Pointe au Pic; H. Simard, P. Maltrais, A. Larouche, J. Couturier, A. Guay, La Malbaie.

AYLMER, ONT.—The Aylmer Electric and Manufacturing Company, Limited, applies for an Ontario charter to supply heat, light and power by steam and electricity in Aylmer, Ont.; capital, $20,000. The incorporators are H. H. McDiarmid, D. C. Davis, J. Simpson, Aylmer; J. W. Champbell, W. H. Irving, Toronto.

J. A. C.

Montreal, August 21.

A New Miniature Lamp Receptacle.

A new receptacle for miniature lamps has been placed on the market by the Empire Lamp Works, of No. 154 West Twenty-seventh street, New York city. The porcelain base of the receptacle, an illustration of which is given herewith, is somewhat smaller than the Edison miniature receptacle, and has some novel features.

Instead of the lamp being screwed into the receptacle it is slid in sideways, with one motion of the hand, the receptacle being so arranged that being pushed home, the lamp is practically locked, so far as joggling loose is concerned. The receptacle is specially adapted for use with battery lamps and one to four-candle-power series lamps, a special base being placed on the lamps to fit the receptacle.

A NEW MINIATURE LAMP RECEPTACLE.

The Empire people have in press their new Fall catalogue. It will contain a number of new features, among which will be illustrations of flower shades, which they have had manufactured in Europe specially for their lamps, and for which they have become the sole agents in the United States. Among the various styles of flower shades are beautiful colored porcelain roses and rosebuds, which are something new in this country, except to Bostonians, who are familiar with the porcelain flowers in the botanical collection of the Agassiz Museum, Cambridge, Mass.

In adapting these flowers to electric lamps, the Empire works are trying to lift electric lighting beyond the mere lighting stage, and make it an artistic decorator.

Change to Electricity Begun on the Alley "L" in Chicago.

The transforming of the alley "L" into an electric road of the latest and most modern type was begun on Monday last, and it is stated that the third rail will be in use before November 1 next. The rails and cables have already been distributed along the route and the bonding of the rails is under way. The feeder cables are bare instead of insulated, as is the custom, and upon a little reflection one fails to see the necessity of insulating the conductors, especially on elevated structures, as long as one of the bare rails carries current all along.

The trial of the Sprague motor system, with which the road will be equipped, will be watched with considerable interest by local engineers, as it is radically different from that in operation on either of the other roads.

On all electric roads now in operation one of the cars is made the locomotive for the entire train, and all the motors are consolidated in one of its trucks. Mr. Sprague, by the new system, gives each of his cars, no matter how many there may be in the train, a motor and a controller, thus making it auto-mobile and independent of all the others. An ingenious system of switches makes it possible for the entire train to be started or stopped, reversed or accelerated, from either of the platforms of any of the cars. This lessens the danger in case of an accident to the motorman and gives any or all of the guards aboard the power to operate the train. The controller, which is to have a place on every platform, has an automatic handle that flies back to "stop" the moment the operator's hand is lifted from it.

Each of the cars is provided with an independent air-brake system, operated from either end of the car, and having its own air pump and accumulator.

The increased safety of the Sprague multiple-motor scheme is only one of the good features claimed for the system. The train answers the demands of the motorman almost instantaneously, more than half the entire weight being upon the driving wheels, which gives them an immediate grip on the rails and makes fast running between stations practicable. All the motors of the train answer the touch of the motorman at the same instant, and there is scarcely strain enough on the couplings to keep the pins from rattling. If for any reason one of the motors becomes disabled it is automatically cut off from the rest of the series and its car is dragged along by the rest of the train.

No great changes in the exterior of the cars is made necessary by the change in motors. The equipping of the alley "L" rolling stock is going on rapidly at the shops at Sixty-third street.

C. E. K.

Mr. J. J. Carty, chief engineer of the New York Telephone Company, is enjoying a well earned vacation on the coast of Maine.

THE CLAMBAKE.

THE AMERICAN ELECTRICAL WORKS ENTERTAINS ITS FRIENDS AT THE POMHAM CLUB, PROVIDENCE—ABOUT 300 ATTEND THE NINETEENTH ANNUAL CLAMBAKE—NAMES OF THOSE WHO WERE THERE.

The gatherings perhaps the most looked forward to of any during the year in electrical circles, from a social standpoint, are the annual clambakes of the American Electrical Works at Providence, R. I. For nineteen years the business associates and friends of this old and well known house have gathered together at some cool spot along the Rhode Island shores and enjoyed the festivities incident to a Rhode Island clambake. On Saturday, August 21, nearly 300 gentlemen assembled at the Pomham Club, so named from the Pomham light, just above which are the club grounds, as the guests of the hospitable host, Mr. Eugene F. Phillips, president of the American Electrical Works, and his associates.

The company arrived at the delightful spot about 10.30 in the morning, and indulged in games, baseball, bowling and billiards, and enjoyed the breezes on the pleasant piazzas near an excellent orchestra. Early in the morning a rumor was circulated that gathered force as it traveled through the company that the clams, which, it was said, had been especially grown for the occasion by Mr. Phillips on his clam reservation, had been covered with seaweed and had begun steaming. Like the bivouacking of a mighty army the assembly gathered at the dining-room at 2 o'clock and the legion of colored stewards, head waiters, waiters and scullions began their arduous task. This is the menu of the clambake:

Chowder.

Clam. Fish.
French Rolls. Brown Bread a la Pomham.

Fish.
Broiled blue a la maitre d'hotel.
Fried eels. Clam cakes.
Salmon and cream, with peas.
Soft shell crabs. Lyonnaise potatoes,
Saratoga chips.
Succotash. Tomatoes. Cucumbers.
Baked
Clams. Lobsters. Quahaugs.
Clam water. Sweet corn.
Pudding.
Suet, brandy sauce.
Fruit. Ice Cream.
Watermelons. Neapolitan.
Black Coffee.

Claret.

Lager Beer. Appollinaris.
Pomham Spring Water.
Ginger Ale. Lithia Water. Sarsaparilla.

After the cigars Mr. E. F. Phillips in a few graceful remarks welcomed his guests and introduced Mr. Samuel L. Powers, of Providence, as toastmaster. Mr. Powers introduced Mayor McGuinness, of Providence, who was vociferously applauded. Mr. McGuinness was followed by Mr. George R. Stetson, second vice-president of the National Electric Light Association, whose explanations of alternating and direct currents and short circuits, apropos of the stairway leading to the water pitchers, etc., met with approval. Mr. Samuel A. Duncan accepted the toast, "Postal Telegraph." Toastmaster Powers called upon Mr. Stephen L. Coles to respond to "Electrical Journals," but Mr. Coles had been obliged to leave early in the proceedings and Mr. R. F. Ross, of Boston, accepted the invitation. Mr. H. F. Wood, of the West End Street Railway, Boston, and Hon. John C. Wyman also spoke.

Handsome souvenirs, natural wood canes with sterling silver heads with the inscription, "Souvenir American Electrical Works' Clambake," were distributed during the dinner, and the tables were left after many hearty cheers for the host. Special trolley cars were then taken for the city, where the company dispersed. The gathering was a distinguished one and many of the oldtime workers in the electrical field were present. Messrs. Stephen D. Field and Frank Ridlon, who were both at the first of these clambakes nineteen years ago, were among the guests. The following are the names of those present:

L. H. Owney, Berry Wilson, W. J. Stetson, W. H. Hathaway, O. W. Hart, E. E. Eastman, W. E. Ober, W. A. Miler, G. E. Beiss, F. Lenoir, F. Edward Smith, A. T. Weeks, W. J. Murdock, A. C. McLillan, H. B. Willard, J. F. Beck, Jas. Joffrey, E. Backus, T. B. Carpenter, G. R. Stetson, R. F. Ross, H. W. Smith, W. D. Shortwell, J. E. Fenley, F. P. Costello, C. F. W. Schlintger, H. F. Woods, C. Q. Ring, H. F. Grant, H. G. Martin, S. L. Powers, Stephen Goddard, W. H. Lane, Stephen D. Crane, S. A. Duncan, H. J. Pettengill, A. MacCabe, W. D. Wright, J. E. Budrew, P. Fahey, T. F. Patt, D. F. Hayden, C. R. Remington, Jr., F. B. Baker, F. S. Peck; C. H. Wagensell, Phillipsdale, R. I.; Geo. R. Cook, Attleboro, Mass.; G. S. Simms, Providence; Jno. C. Wyman, Central Falls, R. I.; W. O. Turner, Boston; H. D. Temple, Worcester; J. Corroy, Boston; Jno. McHugh, Phillipsdale, R. I.; J. Wetzler, New York; S. B. Condit, Jr., F. L. Palmer, Boston; Chas. W. Russell, H. O. Earle, Providence; Jno. Meihren, Baltimore; Edwin E. McGuinness, Mayor of Providence; A. C. White, Providence; E. B. Baker, New Haven; J. T. Albro, Newport; B. G. Brokaw, Salem; F. L. Price, Boston; L. O. Carpon, Pawtucket; R. D. Smith, Westboro; B. F. Simmons, B. E. Waters, Brockton; J. H. Graham, New York; C. N. Goward, W. L. Coleman, Boston; Eugene F. Phillips, president American Electrical Works, W. H. S. Sawyer, Providence; A. E. Bualand, Newport; J. & S. Gordan, New York; James M. Kimbal, Boston; J. H. Scannevin, Newport; J. T. Hatzel, Newport; D. M. Bliss, F. N. Ness, A. Pollard, Boston; E. H. Bailiard, Lynn; C. H. Baker, T. J. Brown, Boston; G. L. Smith, Middleboro; J. L. Mitchell, Chas. B. Burley, Boston; H. M. Young, L. M. Dewine, Woonsocket, R. I.; A. W. Hawden, Waltham; L. A. Derby, E. S. Hosmer, Lowell; J. L. R. Davis, Albany; H. N. Ballard, Boston; A. W. Ham, F. U. Plummer, Worcester; S. A. Leedom, Boston; J. A. Welsh, O. Smith, Pawtucket; W. Layburn, A. D. Blodgett, G. R. Blodgett, Boston; E. F. Peck, Brooklyn, N. Y.; Geo. A. Blaisdell, Woburn; J. Grossman, Waltham; G. W. McBride, Boston; A. L. Pierce, Franklin; B. E. Greene, New York; G. W. Pahnery, W. B. Edgar, Fall River; G. F. New, T. S. New, New York; A. Morrill, Salem; F. J. Lucy, J. A. Applayard, Natick, R. I.; H. P. Moore, Boston; W. H. Taylor, New York *Street Railway Journal*; Wethisbee & Whitney, F. C. Mathews, Boston; C. S. Jones, New Britain; H. A. Philbrook, Jno. Holt, Watertown, Mass.; J. H. Sherman, J. P. Conway, Brockton; C. J. Cobrin, Chelsea; H. Bottomley, Marlboro; J. W. Smith, Brockton; S. J. Fletcher, Quincy, Mass.; F. P. Drake, Canton, Mass.; J. S. Butler, Philip M. Reynolds, Boston; Sam'l Young, Lowell; C. B. Russell, Marlboro; D. W. Dunn, W. M. Denny, J. S. Wells, Boston; T. H. Burrows, C. A. Raymond, Portland; Frank Ridlon, Boston; E. E. Tremaine, Brockton; J. S. Keenan, Boston; H. F. Cottle, Boston; E. B. Hatch, Boston; F. G. Hill, Boston; P. S. Ryan, Boston; B. K. Carpenter, Brockton; H. F. Kellogg, Wellesley; Osborne Pettman, Chelsea; E. M. Ryan, Manchester, N. H.; E. W. Bates, Cohassett; J. B. Coghlin, Worcester; E. A. Chappel, Chelsea; Duncan Kennedy, Lynn; F. B. Grant, Boston; F. R. Wallace, Woburn; Chas. H. Patch, Boston; J. F. Sharey, New London; U. S. Bradley, New Britain; E. F. Fales, Providence; H. U. Joslin, Providence; F. R. Peck, Barrington, R. I.; M. C. Happoldt, Pawtucket; W. C. Fales, Pawtucket; W. W. Dempster, Pawtucket; M. P. Gannett, Jr., Pawtucket; F. A. Hill, Pawtucket; A. Freeborn, Pawtucket; J. D. Adsman, Pawtucket; J. D. Willmer, Pawtucket; S. C. Hutchins, Providence; Chas. F. Luther, Providence; A. F. Potter, Providence; F. P. Howe, Philadelphia; W. N. Monroe, Providence; S. B. Allen, Providence; H. Green, Providence; W. H. Sweet, Providence; J. A. Whitcomb, Baltimore; F. Preston, Boston; Jas. H. Palmer, Providence; Walter Thurber, Providence; A. A. Zeizler, Boston; O. B. Hanxhurst, Providence; E. C. Law, Providence; E. H. Farr, Thompsonville, Ct.; H. S. Tanner, Providence; A. C. Denton, Providence; H. L. Manchester, Providence; B. D. Harris, Providence; W. C. Green, Concord, N. H.; H. M. Barry, Providence; M. T. Agros, 2nd; J. F. Campbell, Pawtucket; F. Scanavin, Newport; L. D. Hogdon, Valley Falls; W. C. Woodward, Providence; L. W. Downes, Providence; F. H. Rickhansen, Providence; H. J. Jarge, Providence; A. C. Shepardson, Waterbury; A. J. Pruington, Stamford; F. L. Terry, New London; S. W. Sweet, Waterbury; L. B. Favor, Gloucester, Mass.; J. A. Cameron, Gloucester, Mass.; J. F. Ross, Boston; Capt. Wm. Brophy, Boston; R. L. Warner, Boston; L. P. Weber, Boston; H. L. Marsden, Brockton; W. L. Adams, Providence; Alfred Greene, Holly, Mich.; W. J. Barnes, Providence; W. A. Tirney, Providence; A. E. Lisle, Providence; J. A. Bickery, Providence; J. B. Smith, Providence; G. A. Wall, Providence; J. P. Owney, J. L. Murdock, J. R. Dickinson, East Providence; W. F. Richards, Newport; J. H. Baker, Providence; J. McNight, Quincy; Elmer P. Morris, New York; B. W. Porter, Derby; W. A. Potter, Quincy; C. M. Ramson, Boston; R. W. Ramson Chicago; Q. Bentley, New London; W. L. Adams, Norwich; Stephen W. Field, Stockbridge, Mass.; Stephen L. Coles, New York, ELECTRICAL REVIEW; H. H. Sherman, Auburn, R. I.; P. C. Ackerman, New York; C. S. Campbell, Providence; F. E. Donohoe, J. M. Atkinson, Chicago; A. G. Walden, Blackstone, Mass.; J. H. Tucker, Providence; E. W. Howard, E. L. Pierce, Worcester; C. W. Holtzer, Boston; J. L. Potter, Chas. E. Earle, Fall River; W. H. Coleman, L. T. Hawley, Andover, Mass.; D. Chalmers, New York; N. M. Russell, Providence; H. E. Brodford, Marlboro; V. A. Thomas, Providence; E. Duffy, F. J. Duffy, Pawtucket; C. M. Coburn, Chelsea; Wm. Anderson, H. C. Spaulding, East Boston; F. W. Austin, Quincy; Jno. V. Darling, J. Heathcote, Providence; E. J. Brooks, Rumford; J. F. Keefe, New York; D. J. Cartwright, Boston; R. L. Whittier, Providence; F. A. Wunder, M. A. Shaw, New York; H. Wheeler, Boston; E. R. Phillips, Providence; Chas. B. Price, Boston; F. N. Phillips, Providence; W. K. Wagner, New Bedford; Chas. Sylvester, Fall River; Robt. Fessenden, E. T. Ames, A. L. Copper, Jno. T. Drake, Providence; J. T. Hedge, Jr., Phillipsdale; W. C. Ingerson, M. J. Chase, Providence; Jas. McEvans, Richmond, Va.; J. B. Murphy, Rumford; Robt. C. Brack, W. S. Prophett, Bridgewater, Mass.; F. C. Holst, C. M. McMurray, Providence.

THE GUESTS OF THE AMERICAN ELECTRICAL WORKS AT THE NINETEENTH ANNUAL CLAMBAKE, POMHAM CLUB, PROVIDENCE, R. I., AUGUST 21, 1897.

Death of George R. Lean.

The news of the death of George R. Lean, of Cleveland, will be a great shock to his many friends throughout the country. During the past few years Mr. Lean had exhibited a very high order of inventive talent, and those who knew him best believed him capable of great things.

Mr. Lean was a New England man and before going to Cleveland had held several important positions—among them the superintendency of the old Sun company, of Woburn, and the superintendency of the Bernstein Electric Company. For several years past he has been superintendent of the Buckeye Electric Company and electrician of the Jandus Electric Company. In these last positions, which he held simultaneously, he had done his best work, making valuable improvements in arc and incandescent lamps and the method of their manufacture. A number of valuable patents were granted covering these inventions.

He died very suddenly in Cleveland, on July 9, after an operation for appendicitis. His age was but 35 years, and his untimely end is deeply mourned by all that knew him.

T. N. Motley & Company.

A noteworthy fact in the advent of electricity for steam roads is the entering into the electrical field of the well known railroad supply house of T. N. Motley & Company, of New York. While the company will not confine its electrical business to railroads by any means, it is significant that the "new force" will be a factor in all railroad interests in future. The management of the electrical department will be under the guidance of Mr. Joseph Keefe, an electrical engineer, whose familiarity with the history of electrical apparatus and machinery is the result of years of application and experience with a number of the leading manufactories of America, and a gentleman who combines a most forceful personality with unusual business sagacity. His work in this particular field is likely to have an effect, particularly in the export lines, as this will have a considerable portion of his attention.

The National Electrical Code.

(Concluded from page 75.)

The object for which this association was started, that is, the securing of uniformity of rules to be enforced by insurance inspectors, having been practically accomplished, and the results of the work of the committee having apparently proven themselves to be proper and satisfactory, the committee felt that they were now in a position to invite general criticisms from all those engaged in the electrical business. Their rules had been adopted by practically all of the underwriters' organizations, 40 of which were using rules printed from the same type; they had been incorporated in the ordinances of 15 or 20 cities, and had received the hearty approval of representatives of many of the most prominent manufacturers and central station men. Early in October, 1895, the committee sent out a circular letter, with blanks, practically broadcast, inviting any suggestions for changes or additions in the present rules. Many such suggestions were sent in, and at the December, 1895, meeting they received careful consideration. At this meeting the discussions and votes were not confined to members of the Electrical Committee, but the full privileges of both discussion and voting were extended to all present, and there were representatives at this meeting from several municipal inspection departments, who took active part in the matters before the committee.

There was still a feeling, however, that the electrical interests did not have as full an opportunity to express themselves on these rules as they were entitled to, and under date of October 15, 1895, a communication was sent to various associations on behalf of the National Electric Light Association and their Committee on Standard Rules, containing resolutions adopted by that committee in September of that year, suggesting a joint conference composed of delegates from the following associations:

American Institute of Electrical Engineers,
American Street Railway Association,
National Board of Fire Underwriters,
American Institute of Architects,
International Fire Chiefs Association,
American Bell Telephone Company,
Western Union Telegraph Company,
Postal Telegraph Company,
General Electric Company,
Westinghouse Electric and Manufacturing Company,
National Electric Light Association,

who should "undertake the codification, promulgation and enforcement of one standard set of rules, which shall meet as fully as possible the conditions that now exist, and be acceptable to all electrical, insurance and allied interests."

Later the Underwriters' National Electric Association, the American Society of Mechanical Engineers and the Factory Mutual Fire Insurance Companies were invited to send delegates, and certain others were invited as complimentary delegates.

From this meeting the National Conference on Standard Electrical Rules was organized in New York on March 18 and 19, 1896, and the voting delegates were limited to those from the

American Institute of Architects,
American Society of Mechanical Engineers,
American Institute of Electrical Engineers,
American Street Railway Association,
Factory Mutual Fire Insurance Companies,
National Association of Fire Engineers,
National Board of Fire Underwriters,
National Electric Light Association,
Underwriters' National Electric Association.

A Committee on Code was appointed, to whom was assigned the task of amending and codifying the standard electrical rules. A pamphlet had been prepared, embracing the various codes, printed in parallel columns. These were carefully discussed, and it was decided that the rules promulgated by the Underwriters' National Electric Association were the most feasible ones to take as a basis. The results of the consideration by the conference were referred to the Code Committee, and that committee met in New York in October, 1896, and prepared a number of suggestions for changes and additions in the underwriters' rules. These were referred to the Underwriters' National Electric Association, through the representative of the National Board of Fire Underwriters. At the annual meeting of the Electrical Committee, on December 8, 1896, the suggestions from the Code Committee of the conference, together with other suggestions from various sources, were considered, and on December 11 several members of the Electrical Committee met with the Code Committee of the conference, and a report was made showing that nearly all of the conference suggestions had been adopted, and giving the reasons why those which were rejected did not meet with approval.

At the meeting of the Electrical Committee of the Underwriters' National Electric Association a sub committee was appointed to recodify the rules, as the changes in the electrical industry had made obsolete the classification of 1892, and it was difficult to incorporate amendments and additions under the proper heading. The committee was instructed to make this recodification, so far as possible, without changing the rules themselves, and to submit the results of their work to the electrical committee for approval. This work of recodification was duly undertaken, but proved to be a work of considerable magnitude, which will account for the delay of some six months in issuing the rules, as the results of the recodification were to be submitted in proof to the Electrical Committee of the Underwriters' National Electric Association for approval, and were also submitted to the Code Committee of the National Conference, and meetings of that committee with the Recodification Committee were held in New York in May and in Boston in June. The rules as recodified had already been adopted by the Underwriters' National Electric Association and the National Board of Fire Underwriters, and the Code Committee of the National Conference passed the following resolution:

"*Resolved*, That each delegate who attended the National Conference on Standard Electrical Rules be sent a copy of the Standard Electrical Code, stating that said code had met with the approval of the Code Committee of the National Conference and the Code Committee of the Underwriters' National Association, and stating the belief of our committee that there was no necessity for calling the conference together as a body again, entailing, as it would, a very considerable sacrifice of time and money, and requesting their immediate reply if they acquiesce in this recommendation, and approve of the report submitted by the committee, and by the president, secretary and treasurer of the conference itself. In the event of their objecting, and desiring that the conference as a body be called together as a body to recieve the committee's report, answer is to be made within 10 days, or their opinion is to be considered as favorable, and the code and reports published through the press by the Code Committee, and each delegate represented at the conference requested to bring same formally before his association for approval."

The rules of the National Board of Fire Underwriters are now printed with the following note:

"The National Electrical Code, as it is here presented, is the result of the united efforts of the various electrical, insurance, architectural and allied interests, which have, through the National Conference on Standard Electrical Rules, composed of delegates from the following associations, unanimously voted to recommend them to their respective associations, for approval or adoption:

"American Institute of Architects.
"American Institute of Electrical Engineers.
"American Society of Mechanical Engineers.
"American Street Railway Association.
"Factory Mutual Fire Insurance Companies.
"National Association of Fire Engineers.
"National Board of Fire Underwriters.
"National Electric Light Association.
"Underwriters' National Electric Association.
"And as soon as meetings of these associations are held, and action taken, the fact will be noted."

These rules received the approval of the National Electric Light Association at its meeting at Niagara Falls, held June 8 of the present year, and will, undoubtedly, receive the approval of the other associations represented in the National Conference; so that now, for the first time, a "National Electrical Code" is issued, stamped with the approval, not only of the insurance interests, but also of the national societies of electrical, architectural and allied interests.

From the foregoing sketch it is evident that the underwriters have from the beginning availed themselves of the advice and suggestions of the electric interests. The 1885 edition of the New England Insurance Exchange rules was prepared with the "aid of some of the leading electric light people." Insurance representatives were present at the Baltimore meeting of the National Electric Light Association in 1885, and while that association took no action on the rules which came from this and later meetings, they were recognized and adopted by the Boston Board and New England Insurance Exchange in 1889. The rules of the New England Insurance Exchange, issued in 1890, were submitted to and approved by the New England Electric Exchange, and when the Underwriters' National Electric Association was organized in 1892, it took as a basis of its rules those which had been formulated in 1891 for the National Electric Light Association by the Electro-Insurance Bureau. The rules prepared by the Underwriters' National Electric Association were submitted to, and received the hearty approval of, representative electrical experts. The insurance interests, however, have always felt that it was their province to settle what should be the electrical equipment of risks which they insured. This course has always been pursued in England, where the Phœnix Fire Office rules are practically the only ones recognized, and it is a position which can be well defended, and must be admitted to be entirely reasonable. It is equally true that the underwriters should not be arbitrary and overbearing, and should make their rules as favorable to the electrical interests as the overcoming of the fire hazard will permit; and we believe that the facts show that this course has been generally maintained.

The principal reason why harmonious relations between the electrical and insurance interests in the matter of uniform rules has not sooner been reached is, we believe, because there was no organization through which the electrical, architectural and allied interests could be reached, until the National Conference on Standard Electrical Rules was formed. For the same reason uniformity of rules in the various insurance boards was not accomplished until the formation of the Underwriters' National Electric Association, an organization through which the various boards could be reached, and in which they had a voice. Just as soon as this association was formed, uniformity of rules, so far as the insurance interests were concerned, became an accomplished fact, and just as soon as an organization of the other interests was formed, complete uniformity of rules was secured.

In the joint meetings between the Code Committee of the National Conference and the Electrical Committee of the Underwriters' National Electric Association, the utmost harmony has prevailed, and suggestions from either have been most courteously considered by the other. If the Underwriters' National Electric Association had not been formed for the purpose of uniting the many independent underwriters' organizations, and had it not been for their ready and cheerful co-operation, it is probable that the National Conference could not have brought about the result for which they were working. The efforts of the members of the Code Committee of the National Conference to secure harmony and uniformity are most certainly appreciated, not only by the electrical, but by the insurance interests as well.

As matters now stand the conference has accomplished its work, and has adjourned. The organization remains, and the work that it has done stands as a precedent, so that, should occasion ever again demand, the machinery could be easily put into motion.

It is recognized that from time to time changes in the rules will have to be made to meet the natural growth in electrical lines; it is, however, felt that, considering the very satisfactory results now secured, and the slight changes needed in all probability for several years to come, the Underwriters' National Electric Association is the most available body to charge with this work of revision for the immediate present.

To keep the conference in commission to do this work is rather difficult, as it requires more time and attention, from men otherwise very busy, than the needs seem to warrant.

It is the purpose of the Underwriters' Association to give in the future, as it has endeavored to do in the past, the fullest hearing on all criticisms, and the members of the National Conference will be fully welcomed and with full privileges of voting at the Underwriters' meetings, thus giving the very largest liberty and breadth to the makeup of the Underwriters' Association.

POSSIBILITIES OF LIQUID AIR IN ELECTRICAL WORK.

BY ELIHU THOMSON IN "MODERN MACHINERY."

The well known effect of cooling by liquid air or like gases a conducting metal like copper is to almost abolish its resistance. Consequently a conductor so cooled is able to carry very much larger currents with less loss than at ordinary temperatures. This fact has attracted the notice of electricians and physicists for a long time past.

It has recently been found that liquid air is one of the most perfect insulators, and that most insulating materials cooled to the temperature of liquid air are greatly improved in insulating qualities. It is known also that cooling renders it more difficult to cause a spark to occur between oppositely electrified conductors, the striking distance for a given pressure being diminished.

The stability or permanence of liquid air in bulk, even when it is fully open to the ordinary atmosphere or kept at atmospheric pressure, is, of course, simply dependent upon the heat insulation provided, and if this could be made perfect, the air would never evaporate.

Recent methods, such as those of Hampson and Linde, make it possible to obtain large quantities of liquid air by simple means and with moderate expenditure of power.

Niagara power is 24-hour power, and as there are but few industries demanding power for the whole day, it must follow that surplus power is either not used or wasted, and that to keep the plant working night and day at full capacity is desirable, even if some of the power only yields a moderate return. Can it not be used in making liquid air? Can not the excess at certain times of day be put to use in compressing air to be afterward liquefied on the large scale?

It would seem that large tanks of liquid air can be heat-insulated very perfectly by layers of air and fibrous material properly placed outside. The evaporated air from the tank could traverse the jacketings in successive order from within outward, so as to help keep down the temperature of the jacketings. A furnace with an internal temperature of 2,000 degrees to 3,000 degrees above the normal temperature of the air is easily insulated by moderate thicknesses of asbestos or other fibrous coating, so that the outside temperature is but slightly above the normal. The temperature difference between liquid air and normal air is, say, one-eighth of that between the interior of the furnace assumed and the normal, so that it ought to be possible to insulate so that but little heat would enter. In most electric long-distance transmission lines a loss on the line of about 10 to 15 per cent is suffered. With 18,000 horse-power this would mean from 1,000 to 1,500 horse-power lost in resistance of line. If the conductors were immersed in a pipe with liquid air, the loss might fall to not over one to two per cent, perhaps, leaving available a large power for condensing air to supply evaporation. Just how far 1,000 horse-power would go in keeping the conductors supplied with liquid air coatings is a matter requiring data to determine. But, if it were not sufficient for the purpose, there is a surplus of power during certain hours to supplement it.

But it may be possible that a much higher voltage than is now used (10,000 to 20,000 volts) may be successfully used with conductors cooled and insulated by liquid air. If the potential could be raised to 50,000 volts, either the loss on the conductors for a given power transmitted would fall off as the inverse square of the voltage, or the conductors could be made smaller in the same proportion, or the distance of transmission increased with the same section of conductors as the square of the potential. These are matters worthy of experimental determination.

The limit to the capacity of an electric transformer to transfer energy from its primary to its secondary circuit is found in the heating and loss involved in the copper conductors comprising these circuits, and upon the nearness with which the two circuits may be placed one to the other, which is in turn governed by the insulating material used to separate them.

Could the conductors be kept cool by liquid air, and thereby their conductivity and insulation greatly increased, the work of transfer in a transformer could be much greater for a given size than it now is, or the loss could be even less than it now is, athough but three per cent is sacrificed in ordinary practice.

Transformers in liquid air might be made entirely of copper without iron, and their light-load efficiency become nearly equal to full-load efficiency.

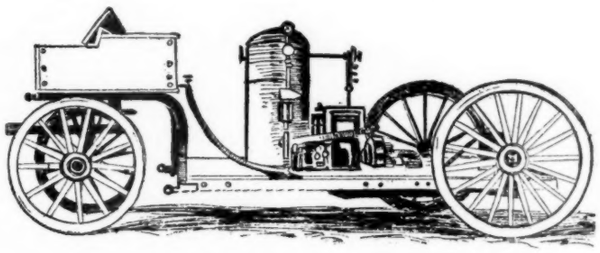
A transformer without iron would avoid the loss in the iron and would permit such a saving in material that changes in design or disposition of the copper could be made to suit the conditions.

We need not touch upon the possibilities of liquid air as a means of energy storage, for they are self-evident enough, since liquid air is virtually compressed air which remains compressed, as it were, even when exposed to atmospheric pressure; that is, addition of heat gives to it pressure and the ability to do work in suitable engines in the usual compressed air motors. Our object has been to briefly point out what may be termed possibilities in electric engineering, assuming that data favorable to the ideas presented be the outcome of experiment.

It is too early to make any predictions or calculations concerning this object. It must be confessed that it has a certain fascination. Perfection of heat insulation seems to be the key to the situation. All else seems to depend on that, the main questions being what will it cost in power and machinery to supply the necessary evaporation waste in a system of the kind outlined, and whether the voltage of transmission can be raised in consequence of the new conditions.

A Portable Engine for Hauling In Underground Cables.

Mr. W. H. Johnson, superintendent of the cable department of the Bell Telephone Company of Missouri, has devised a scheme for the rapid installation of underground cables. It consists of a portable petroleum engine of three and one-half horse-power geared to a capstan, the engine, capstan and oil supply tank being located on a low truck as shown in the illustration herewith. The scheme will soon be tried in actual practice and is expected to result in a considerable saving of time and money.



A PORTABLE ENGINE FOR HAULING IN UNDERGROUND CABLES.

A rope is attached to the cable and then run through the conduit. This rope winds about the capstan geared to the engine and thus the cable is pulled into a manhole and through the conduit. Where the cable enters the manhole it runs through a piece of rubber hose, which keeps it from being in any way injured. The capstan is so geared that a cable may be hauled in at the rate of five feet per minute or 20 feet per minute. The cost of fuel for running the engine is said to be 40 cents per day.

Big Electric Combine in Salt Lake City.

The articles of incorporation of the Union Light and Power Company, of Salt Lake City, Utah, which is a consolidation of the Pioneer Electric Power Company, the Salt Lake & Ogden Gas and Electric Light Company, the Big Cottonwood Power Company, the Little Cottonwood Power Company, the Citizens' Electric Light Company and other properties, have been completed. The capital of the company is $4,550,000, divided into $100 shares. The principal stockholders are prominent Mormons. The corporation is to exist for 50 years, and has broad privileges.

Fourteen electric cabs were put in public service in London on August 19.

Electric Lights Again in Paterson, After Many Tribulations.

As told in the ELECTRICAL REVIEW last week, the station of the Edison Electric Illuminating Company at Paterson, N. J., was shut down for a few days because the coal bunkers gave way and the coal contained in them buried the boilers. By putting to work a large gang of laborers the boilers were finally dug out and 1,200 tons of coal shoveled to one side.

About 8 o'clock P. M. on August 15 the wreck was cleared away from one of the boilers. It was found to be in good shape, but the steam pipes and fittings were twisted, bent, and broken off. Workmen from the Passaic Rolling Mill straightened out the pipes, and then a gang of steamfitters replaced the battered fittings. About 2 o'clock A. M. on August 16 steam was raised in the boiler, and shortly afterward one of the dynamos was put in motion. Then there was light. By morning another boiler was made ready, and when 6 o'clock came the electric cars were enabled to start and maintain almost schedule time.

The following story is told of a gang of Italians who were employed to shovel the coal from around the boilers. The men agreed to work for 12½ cents an hour double time, but after a while became discontented. They sent word to the boss that they would quit unless they got 15 cents an hour at one and a half time. It did not take long to settle that strike.

After current was sent over the lines again, the Edison company got word that the lights on lower Carroll street were out. Two linemen, who were sent out to investigate, decided that the trouble was in a switch box on a certain pole, and both climbed the pole. The moment the door of the box was opened a swarm of bees came out and attacked the men. They hastily closed the door, but were forced to descend to escape the bees which had got out. After a short wait the men went up again. They knocked the box loose from its base and then shoved it off the pole to the street. After that the repairs were made, and another cause of darkness removed. The shock of the fall caused the bees to forsake the box, and a quantity of honey was taken from it. Before it was replaced the bees swarmed to a tree near by.

Several of the large department stores in Paterson are talking of bringing suit against the Edison company, as they were compelled to close down on account of the failure of the electric lights to burn. The loss in traffic to the Paterson Railway Company caused by the accident is at least $3,000, and that to the other two trolley lines about the same. The Edison company loses about $25,000 or $30,000 on account of its failure to supply light and power, but under its contract it can not be held for damages caused by accident. In addition to the motive power furnished to the various trolley lines in Paterson and vicinity, the Edison company supplies current for 654 arc lights in the city and 134 throughout the county; 300 incandescent and 150 ordinary arc lights in stores are supplied, and 20,000 incandescent lamps in business places and private residences. There are 12,000 fans in operation in Paterson. Current was also supplied to 132 motors in different manufacturing establishments.

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Special Notice to Advertisers.

***CHANGES** for advertisements must be in this office by Friday noon for the following week's issue.*

***NEW ADVERTISEMENTS** should be in the office not later than Saturday noon to insure publication the following week.*

NEW YORK, AUG. 25, 1897.

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A Sunday school superintendent in Wichita, Kas., proposes to conduct his school by telephone. Who says Kansas isn't up to date?

The iron and steel industry is getting its share of the new prosperity. Market reports show that there is an excellent demand for light steel rails by electric roads in the smaller cities and towns. This is a good sign, whichever way you look at it.

Signs of renewed activity are apparent in every branch of the electrical field. Manufacturers and dealers appear to be making extensive plans to handle a large Fall and Winter trade, which is assuredly indicated by present demands.

The work of the Metropolitan Street Railway Company on its new underground conduit lines in New York city is under good headway. It looks now as if the great American metropolis was at last to do away with at least a small proportion of the long-ago out-of-date motive power, familiar to old residents as car horses. New York city has evidently profited by the experience of thousands of country towns and is making its way gradually toward the period of progress reached by them years ago. We may yet live to see the day when there will be no car horses in New York city.

The inhabitants of Greater New York have cause to congratulate themselves on the fact that the last obstacle has been removed which might have prevented the elevated roads from crossing the New York and Brooklyn Bridge. The legal matters in connection with this important project have all been satisfactorily adjusted and the trustees of the bridge have granted the required permission. It is expected that the motive power to be used will be electricity, and from the manner in which the matter is being carried forward it seems safe to assume that it will be but a few months before passengers from New York city can make the trip to various points in the city of Brooklyn without a change of cars.

Cincinnati gives good evidence of her hustling qualities in making an early bid for the 1898 convention of the American Street Railway Association, as will be noted in a communication on another page. Cincinnati possesses all the requisite advantages necessary to a convention city, and has the added distinction of being the only city in the United States equipped with a double-trolley electric railway system. The suburbs of the Queen City of the West are unsurpassed in loveliness; her places of amusement rank with the best; the Springer Music Hall is beyond competition as a convention meeting place; the city is centrally located from a railroad standpoint, and last, but not least, the hospitality of her citizens combines the cheerful welcome of the West with the warm-hearted cordiality of the South. Here's to Cincinnati as the next meeting place of the American Street Railway Association!

LORD KELVIN.

Lord Kelvin, who came all the way from his home in Scotland to attend the meeting of the British association at Toronto, stands pre-eminently at the head of the electrical field, both in point of years of service and for the practical character and commercial success of his inventions and researches. He was born at Belfast, Ireland, in June, 1824. His father, Dr. James Thomson, was at that time lecturer on mathematics at the Royal Academical Institute at Belfast, but he removed with his family to Glasgow on receiving an appointment to the professorship of mathematics in the university there. Lord Kelvin, then known as plain William Thomson, entered the university at Glasgow, and after graduating removed to Peterhouse, Cambridge, where he graduated in 1845 as second wrangler. He was elected a fellow of Cambridge, and in 1846 he was appointed to the chair of natural philosophy in Glasgow, which he has held ever since. He became about the same time editor of the *Cambridge and Dublin Mathematical Journal* and held this place seven years. He became an authority upon electrical matters in the early years of his professorship, and although he pursued many other lines of study and made many valuable mechanical inventions in other lines, it is upon his electrical work that the greater part of his fame rests. He and Mr. Varley were the electricians on the "Great Eastern" in charge of the work of laying the Atlantic cable of 1865 and the successful one of 1866, and the tests of the cable which were carried on during the work were made with Thomson's mirror galvanometer. When the cable of 1866 was successfully laid, Professor Thomson was knighted by the Queen for his share in the work, and became Sir William Thomson. To him also was presented the freedom of the city of Glasgow. Two of his most valuable inventions are a mariner's compass so made as to render it free from the variations which would otherwise result from its being on an iron or steel vessel, and a sounding lead which can be cast to depths as great as 100 fathoms without checking the speed of the ship and which preserves a perfect and accurate record of the depth.

A step recently taken by the Western Union Telegraph Company is highly significant of the business revival which is obviously in progress in this country. The pressure on the telegraph lines has increased so much of late that an additional day operating force has been required. Instead of employing new outside operators the company has directed its night force to a large extent to report for day duty also. It has been several years since it was necessary for such pressure to be put by the company upon its employés. Receipts at the Western Union test offices indicated excellent gains in revenue.

BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

NEWS OF THE MEETING IN TORONTO —PROMINENT ELECTRICIANS PRESENT—AN INTERVIEW WITH LORD KELVIN.

TORONTO, ONT., August 21, 1897 —The British Association for the Advancement of Science is holding its annual convention in this city, and is attended by a thoroughly representative delegation. From the list of distinguished gentlemen whose names follow, it will be seen that nearly all branches of science are represented, and by their ablest exponents. A number of distinguished visitors from the United States are present, including Professor Cross, of Boston; Professor Barker, of Philadelphia; Professor Carhart, of Ann Arbor; Mr. Charles F. Brush, of Cleveland, and Professor Putnam.

The field of electrical science is ably represented, the leading electrician of the world, Lord Kelvin, being present, in all his active and hale personality, although in his seventy-fourth year. In a pleasant talk with the editor of the ELECTRICAL REVIEW, at Toronto, on Wednesday, the day of his arrival, he expressed himself as greatly pleased with his visit to this country, the second one he had made, and stated that he expected to remain until about the middle of September sight-seeing, and would probably sail from New York city about that time.

In speaking of Niagara Falls, Lord Kelvin became quite enthusiastic. He was reported as saying while there that he expected to see all the water of the great Falls pass through machinery to the level of Lake Ontario, and eventually the Niagara Cataract would disappear. On being asked about this at Toronto, Lord Kelvin said:

"Well, I distinctly say this—I do not believe the use of water-power from Niagara Falls will be limited to 450,000 horse-power, which is the amount for which the concession has been given to the company. In my opinion it will not stop at that; but as the demand goes on increasing, so the amount of horse-power developed will increase, until the whole water-power of Niagara will be used for doing mechanical work."

"You have been already interviewed, Lord Kelvin, upon the works at Shoreditch for producing electricity from dust?"

"Yes; the Municipal Council of Shoreditch, instead of paying two shillings and three pence per ton, as they used to do, for getting their garbage carted away and thrown into the sea, now burn the garbage, and thus get as much heat as would be obtained from one-third of the material's weight in coal. At some seasons of the year the dust bins give a much larger proportion of heat, because there are more cinders in the refuse. In Summer there is comparatively little heating power in the dust, because the proportion of cinders is so small. During Winter the dust yields perhaps three times as much heat as it does in Summer. Wherever the dust has sufficient combustible matter in it to give good results, for getting up steam or for other purposes, by burning in proper furnaces, I believe this system will be adopted."

Lord Kelvin stated that he should remain for nearly a week in New York on his return.

"Say to Mr. Tesla," he said, as the American newspaper man took his leave, "that it will give me much pleasure to see him on my return to New York. I have just received a valued letter from him."

The hospitable people of Toronto have left nothing undone to make the visit of these distinguished gentlemen and their ladies thoroughly enjoyable. A public reception was held Wednesday afternoon at the pavilion in the beautiful Horticultural Park, at which Mayor Shaw presided, and the Governor-General, the Earl

LORD KELVIN.

of Aberdeen, extended a welcome on behalf of the entire Dominion. Other addresses of welcome were delivered by the mayor and commissioner of education and were responded to on behalf of the association by Lord Lister, Lord Kelvin and Sir John Evans. The wealth and beauty of Toronto were present on this occasion. In the evening of the same day Sir John Evans delivered the inaugural address on "The Antiquity of Man."

The sessions will continue until and including next Tuesday, when the visitors from the Old Country will start on their trip across Canada to British Columbia.

A number of the engineering journals of London are represented. The ELECTRICAL REVIEW is the only electrical journal of the United States represented, Mr. Chas. W. Price, the editor, and its Toronto correspondent both attending.

The preliminary meetings and the welcome by the city's representatives are over. The first regular meeting of the association occurred in Massey Hall, on Wednesday evening, before a large and representative audience.

It was the most distinguished gathering ever assembled in this city of conventions.

Lord Lister presided, surrounded by very nearly 100 of the world's most distinguished scientists, among whom were Lord Kelvin, Sir John Evans, Lord Lister, Professor Rucker, Professor Roberts Austin, Professor Lodge, Prof. Silvanus Thompson, Professor Ayrton and Professor Rowland, while Lord and Lady Aberdeen, the Governor-General and his wife, graced the meeting with their presence. Massey Hall was garlanded with 66 banners, representing the 66 annual meetings of the association, and the hall was filled with an audience of more than 2,000 people.

Lord Lister, the retiring president, introduced Sir John Evans, the president-elect, beginning in a way seldom heard here and never there:

Your Excellency, my Lords, Ladies and Gentlemen.

Sir John Evans read a very interesting paper on "Archæology," which was discussed by Lord Kelvin.

On Thursday evening occurred the most brilliant social event during this gathering, when Their Excellencies Lord and Lady Aberdeen held a vice-regal reception in the legislative chamber at the Ontario House of Parliament in honor of Lord Kelvin, Lord Lister and Sir John Evans, where they welcomed more than 2,000 guests, representing every civilized land. The reception was a very brilliant affair, the guests continuing to arrive from 9 until 11 o'clock, dispersing about midnight.

On Thursday the most interesting lecture, to the lay mind, was given by Professor Roberts-Austin, chemist to the Royal Mint, London, on "Canada's Minerals." He introduced the electric furnace, throwing upon the screen the action occurring in melting silver, chromium and copper. The audience was delighted, and enthusiastically accorded Professor Roberts-Austin a vote of thanks for his very instructive lecture.

A brilliant scene occurred at the Pavilion on Friday, when there was a special convocation of the University of Toronto, the occasion being the conferring of honorary degrees upon Lord Kelvin, Sir John Evans, Lord Lister and Lord Rayleigh.

Lord Kelvin to-day gave an informal talk on the world's fuel and water supply. He remarked that the available water supplies of the world are only equal to a very small portion of the world's requirements in power and that our future fuel supply is all-important.

To-day the visitors are holiday-making on a visit to Niagara Falls, and will resume their meetings on Monday. The attendance is estimated at 1,700. STUART.

Toronto, August 21.

The New Haven Railroad is installing storage batteries at its Hartford and New Britain, Conn., stations for lighting service. The third rail will be tapped for the battery supply. It costs $500 a month at present to light the Hartford station, and the cost under the storage system will, it is said, be about one-fifth of this amount.

Mr. Louis Glass, assistant general manager of the Pacific Telephone and Telegraph Company, of San Francisco, after spending several days in each of the large eastern cities, is now on his way back to the coast.

American Bell Telephone Company vs. National Telephone Company.

The case of the American Bell Telephone Company against the National Telephone Company, of Boston, which was to have been argued in the United States District Court of Massachusetts during the past week, has, by mutual consent of the attorneys, been postponed until October 15. This suit was originally brought in August, 1895, when the Bell company applied for a restraining order from the court to prohibit the National Telephone Company from using any transmitter covered by the scope of the Berliner patent of 1891. The National Telephone Company immediately began preparations for the defense, employing Mr. Edward P. Payson as counsel and Professor Brackett, of Princeton College, as expert. The case for the Bell company has been placed in charge of Mr. F. P. Fish, since the death of Mr. Storrow, and who at the present time is said to be seriously ill with typhoid fever. The independent interests, particularly since the last important telephone decision was rendered, have generally awakened to the importance of this suit and it is apparent that the National Telephone Company are intending to make a strong, vigorous fight.

Cincinnati Wants the Next Street Railway Convention.

TO THE EDITOR OF ELECTRICAL REVIEW:

A very enthusiastic meeting of the street railway people and supply men was held to-day, called by the Cincinnati Convention League, and it was unanimously decided to not only invite but to do everything in their power to secure the 1898 meeting of the American Street Railway Association for Cincinnati.

Invitations will be extended by the different street railway companies and also by the different commercial bodies, the city, etc., at the next meeting at Niagara Falls and every effort made to secure this meeting.

This city is centrally located, having perfect railway facilities and one of the finest buildings in this country for convention purposes, the Music Hall, and power building which is attached.

At the meeting to-day committees were appointed and will report at a meeting to be held August 31, at which time definite form of action will be decided upon. We want this convention. Yours truly,

G. R. SCRUGHAM.

Cincinnati, August 20.

LATE NEWS.

Mr. F. C. Manning, of Sumter, S. C., informs the ELECTRICAL REVIEW that he contemplates the erection of a telephone exchange of 100 subscribers capacity.

The electric cars of the Penn Yan, Keuka Park & Branchport, N. Y., road commenced running on August 14, and have since been making regular trips. Freight and express offices will be established at once at Keuka Park and also at Kinney's Corners.

ELECTRIC RAILWAY NOTES.

The Co-operative Electric Railway Company, of Chicago, has certified to a change of name to Twentieth Century Electric Company and enlargement of object.

The city street-car line of Charleston, W. Va., and all its property, which has been in the hands of the court for two years, has been sold to a Cleveland, Ohio, firm for $21,000.

A permit has been granted to President Leslie Carter, of the Chicago Alley "L" road, to substitute electricity for steam as the motive power on that system. The third-rail system is contemplated.

The Lancaster & Hamden, Ohio, Railway is advertised to be sold September 1, at not less than $150,000. There is a rumor that the Kruger syndicate will purchase it and extend it into the Jackson County coal field.

The Cincinnati Street Railway Company will shortly ask the Board of Affairs for permission to change over all its cable lines to trolley roads. It is expected that before January 1 not a single cable car will be running in the city.

Work on the branch trolley road to connect the suburban line at Farmington, Ct., with the Central Railway and Electric Company's line at Plainville has been discontinued, and it is said the line will not be built until next year.

The Troy, N. Y., City Railway makes the following statement for the quarter ended June 30: Gross earnings, $153,447; net, $67,511; other income, $1,03 ; charges, $36,896; surplus, $31,654; cash on hand, $13,137; profit and loss (surplus), $164,762.

It is reported that the Portland General Electric Company, of Portland, Ore., has had a survey of the Klickitat Falls made recently for the purpose of furnishing electricity for The Dalles and Goldendale, and to build an electric line from Lyle to Goldendale.

The Illinois Central Railway is about to experiment with electricity as a motive power, with a view to its adoption on all the suburban lines of Chicago. It is said that both the third-rail and overhead trolley system will be tried exhaustively before a decision is come to on equipment.

The gross income of the Brooklyn, N.Y., Rapid Transit Company, which includes the Brooklyn Heights and the Brooklyn, Queens County & Suburban roads, for the year ending June 30, was $2,315,014.96, an increase of nearly $60,000 compared with that of the previous year.

The Consolidated Traction Company, of New Jersey, has effected an agreement with a steamboat line and the Long Island Railroad by which the people of Newark can be taken to Manhattan Beach and Coney Island direct from Newark. This arrangement went into effect last Saturday.

It is reported that the total length of electric railway track—not line—in the United States is now placed at 13,500 miles, besides some 2,500 miles of dummy, cable and horse railway track. The steam railroads have a present length of 182,000 miles of main line, and a total of 236,000 miles of track.

City Attorney Comfort has brought suit against Flint & Scott, owners of the Stillwater, Minn., Electric Railway, to compel them to take up the tracks and to annul the franchise, the city having been unable to effect a compromise. Injunction proceedings, started some time ago, were dismissed recently to make room for the new suit.

At the annual meeting of the Hanover Street Railway Company the following officers were elected for the ensuing year: President, Charles W. Grose, of Norwell; vice-president, Charles H. Killam, of Hanover; clerk and treasurer, Richard J. Jenness, of Boston. Directors, Charles L. Stevens, of Rockland; Albert Hines, of Newton; M. A. Coolidge, of Fitchburg, and Geo. Whiting, of Boston.

The plants, rights, privileges, real estate, rights of way, franchises, and all the corporate properties of the DuBois, Pa., Traction Passenger Railway Company and of the DuBois Electric Light, Power and Heat Company have been sold by Sheriff Smith. M. F. Leason, Esq., of Kittanning, purchased the plants for Kittanning parties. The railway was sold for $61, subject to a mortgage of $40,000, and the light plant for $100, subject to a mortgage of $50,000.

The third-rail service between New Britain and Berlin, Ct., began last week, the second track having been completed on August 18. Both tracks will be used by the steam freight trains. The third-rail cars will be for passenger traffic. When the line is in good running order, the matter of hauling freight trains by motor cars will be taken up. The grade is 50 feet to the mile, and it is all that an engine with 16-inch cylinders can do to haul 12 loaded freight cars on it.

A decree has been filed in court discharging the receivers of the Baltimore & Catonsville Construction Company, which had the contract for building the Columbia & Maryland Electric Railway between Baltimore and Washington. The Washington end of the line has been in operation some time and work on the Baltimore end will be resumed at once. The discharge of the receivers was opposed by certain creditors of the construction company, whose claims are disputed. These claims are left for the further order of the court.

Toronto, Can., derives an income of about $200,000 per year from street railway franchises. The company pays the city $800 per annum for each mile of track operated; eight per cent on all the gross receipts up to $1,000,000 per annum; ten per cent between $1,000,000 and $1,500,000; 12 per cent between $1,500,000 and $2,000,000; 15 per cent between $2,000,000 and $3,000,000, and 20 per cent on all above $3,000,000. There the regular cash fare is five cents. Twenty-five tickets are sold for $1, and eight workingmen's tickets, good morning and evening, are given for 25 cents. Children under 10 are carried for half fare.

The Southwest Missouri Electric Railway Company has decided to put in a telephone system over its entire route at once and run its cars by a dispatcher's orders. A telephone will be placed at every switch on the road, so that conductors can receive directions and can notify the main office of their location. Station signals will also be established at important points on the line and new steel bridges are to be built. This will be done to enable the electric line to make better time and compete with the 'Frisco railway's inter-urban service. The electric line connects Joplin with Webb City, Carterville, Prosperity, and Carthage, Mo., and Galena, Kas.

Officers of the Metropolitan Traction Company, of Chicago, Ill., which has a franchise to operate trolley lines over nearly every country road in the county, have succeeded in negotiating a loan of $2,000,000 with the Equitable Trust Company as trustee and the State Trust Company as co-trustee. It is announced that the money secured will be used in building and equipping the road. Work on the proposed trolley system, extending from one end of the county to the other outside the boundaries of the city, will, it is said, be started before March 1. Under the terms of the deed the company is enabled to dispose of 2,000 20-year first mortgage five per cent gold bonds in the denomination of $1,000 each.

The Elgin, Ill., Carpentersville & Aurora Railway Company has been organized with a capital stock of $500,000, all of which is subscribed for. The new corporation purchases all the property and rights of the local street railway company at Elgin, including the lighting plant and the lines to Carpentersville and to Geneva. The incorporators are William Grote, George P. Lord, David B. Sherwood, James B. Lane, F. Dunbar Waldron, George M. Peck and Alfred B. Church. The purposes are broad ones, authorizing the use of the various systems of propulsion, the carriage of passengers, the furnishing of light, power and heat, and the sale of electrical appliances. It is proposed to extend the lines possibly to Lake Geneva, Wis. The company now has 30 miles of track.

The newly reorganized New York, Elmsford & White Plains trolley road, which is designed to connect the Hudson River with Long Island Sound, having White Plains, N. Y., as a center, has taken a fresh start. It was recently purchased by a syndicate of capitalists, who met last week and elected the following directors: Samuel R. Bullock, of Philadelphia; V. A. Krepps, of White Plains; Herbert F. Jennings, William D. McQueston and Charles B. French, of Mount Vernon, N. Y.; Dwight S. Mason, Charles V. D. Peck, Paul Armitage, and William J. McCormick, of New York. These are all new men, with the exception of Mr. Krepps, who was a member of the old company and the promoter and projector of most of the trolley roads in Westchester County. The new company intends to finish the line at once to Tarrytown, which has long been hanging fire, and will then run the extension to Mamaroneck on the Sound.

ELECTRIC LIGHT FLASHES.

The Gibson House, at Cincinnati, Ohio, is putting in a $15,000 electric plant to make its own light.

At the annual meeting of the Ellsworth, Me., Electric Illuminating Company the following were chosen directors for the ensuing year: H. M. Francis, Henry W. Darling, Mr. Shippey, S. M. Hamill and Judge A. P. Wiswell.

The new electric lighting plant in the New York Post Office Building has been completed. There are 4,000 lights in the 196 rooms of the building, and the government expects to save $35,000 a year by running its own lighting and heating plant.

The Citizens' Steamboat Company has substituted its own electric light service on the steamboat dock at Troy, N. Y., for that of the Troy Electric Light Company heretofore in use. The boats of the company are lighted by electricity, and the power for the dock lights is generated on board the boats.

The Consolidated Electric Light Company, of Portland, Me., is enlarging its power-plant on Plum street. Two large boilers are being put in to take the place of the five small ones. These new boilers will increase the aggregate capacity of the plant by about 1,350 horse-power. Several new 350-horse-power engines are also being put in.

American Association for the Advancement of Science.

At the recent meeting of this association, held at Detroit, Prof. Frederic W. Putnam, of Harvard University, who has been secretary of the association for 25 years, resigned that office and was elected president. Other officers were elected as follows:

Vice-presidents—Mathematics and astronomy, E. E. Barnard, Yerkes University, Chicago; physics, Frank P. Whitman, Adelbert College, Cleveland, Ohio.

Permanent Secretary—L. O. Howard, Department of Agriculture, Washington, D. C.

General Secretary—D. S. Kellicott, Ohio State University, Columbus, Ohio.

Secretary of the Council—Frederick Bedell, Cornell University, Ithaca, N. Y.

Secretaries of the Sections—Mathematics and astronomy, Alexander Ziwet, University of Michigan, Ann Arbor, Mich.; physics, E. B. Rosa, Western University, Middletown, Ct.

TELEPHONE NEWS AND COMMENT.

The Ottawa Telephone Company, of Holland, Mich., has been incorporated, with a capital stock of $10,000.

The New York State Telephone Company has submitted to the Canastota, N. Y., Mutual Telephone Company three propositions for putting in a local system.

The British Government is making arrangements with the Halifax & Bermudas Cable Company for the laying and maintenance of a cable between Bermuda and Jamaica.

The Pittsfield, Mass., City Council has given the local Bell telephone company a 20 years' monopoly of the streets of the town, but the wires must go under ground.

The citizens of Lapeer, Mich., are objecting because the Bell Telephone Company has raised the Detroit rate from 25 to 45 cents, since the company put in a metallic circuit.

General Superintendent Reilly, of the New York & New Jersey Telephone Company, of Brooklyn, is convalescing rapidly from a 10 days' illness, which confined him to his home.

Telephone wires to New Bedford and Fall River, Mass., and Newport, R. I., operated by the Southern Massachusetts Telephone Company, were not operated on August 16, due to a severe lightning storm in that district.

The Nebraska Telephone Company is extending its line southward from York to McCool, Fairmont and other points in Nebraska. A large force of workmen is at work putting in the poles and stringing the wires. The company is also making some improvements on its lines and connections in York.

Action on the sale of 1,500 shares of stock of the American Bell Telephone Company, remaining out of 23,650 shares offered to stockholders at $214 per share, which will be sold at auction, will go over until the latter part of September, possibly later. President Hudson and many of the directors are abroad, and there will be no August meeting of the board.

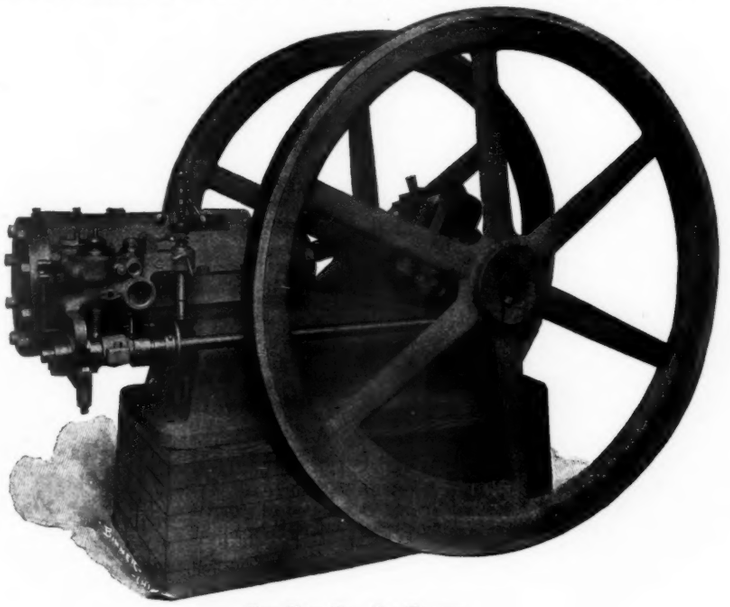
The Michigan Bell Telephone Company at present charges from $50 to $100 a year for individual lines in Detroit, according to distance from central offices. The company has announced that beginning October 1 next the cost for all residence telephones within the city limits will be $24 a year. The Detroit Telephone Company's rate is $25. The latter company states it will not meet the new rate of the Bell company.

The New England Telephone and Telegraph Company offers 10,395 shares of the capital stock now remaining unsold in the treasury to stockholders for cash at par in proportion to their respective holdings. Stockholders of record at close of business August 21 will be entitled to take, at $100 a share, in the proportion of one share for every 10 shares held. Subscriptions must be for full shares. The right to subscribe expires at one o'clock, September 18. Half payments must be made on November 4, 1897, and February 8, 1898. The stock will be issued on the dates mentioned for payment.

A local builder has received orders for the erection of three buildings for the Philadelphia Bell Telephone Company, one to be erected at Seventeenth and Poplar streets, size 26 by 60; one on Church street, near Paul, Frankford, size 26 by 77; one on Preston street, near Filbert, West Philadelphia, size 67 by 50. All will be two stories high. The company is laying the city out in blocks, or districts, and about the center of each block will be a station, with which subscribers in that district will connect. They will thus be saved the annoyance and delay occasioned by long distance from the central office. It is the intention of the company to erect district buildings in various parts of the city as fast as the system is perfected and the requirements of business demand them. The present building at Fourth and Market streets will be used as the central station for a district bounded by Vine and South streets and the Delaware River and Eighth street.

The New Era Gas Engine.

In the illustration herewith is shown a gas engine manufactured by the New Era Gas Engine Works, Dayton, Ohio. This engine has been on the market for several years, and is in extensive use throughout the United States. It is a slow-speed machine and is heavy, strong and simple in design. It is built on the plan of a lateral shaft, rotated by a spiral gear on the crank shaft, which in turn drives the governor by bevel gears and operates directly on the valves by means of cams. The manufacturers claim that this gas engine is very easily kept in running order owing to the absence of rods, arms, elbows, cranks, eccentrics and belts. The valves are set so that they can be taken out or ground in, simply by removing the nut that holds them in place without disturbing any other part. The New Era gas engine is of the four-cycle type and is self-scavenging. A large number of these engines are in use for operating isolated electric light and power plants. The engines are made in sizes from eight horse-power to 60 horse-power.



THE NEW ERA GAS ENGINE.

The work of constructing a new main telephone exchange at Montreal, P. Q., which has been in progress for some time, is now completed, a switchboard of the most modern type, the cost of which was $500,000, having been placed in the operating room of the new telephone building and subscribers' lines connected thereto. The new exchange went into service on August 14.

CHICAGO NEWS ITEMS.

Mr. Ludwig Gutman, of the Royal Electric Company, Peoria, Ill., is taking a few weeks' vacation and selected Chicago as the most suitable summer resort in which to rest from his exacting duties.

Mr. Wm. Wright, who, as manager of the Chicago Armature Company, has made such a large number of friends, has taken the general western agency for the E. G. Bernard Company, of Troy, N. Y., with offices at 939 Monadnock Block. Mr. Wright's experience in this line and his wide acquaintance among the trade will make it an easy matter for him to secure a liberal share of the dynamo and motor trade in this territory.

Mr. C. C. Haskins, after having been identified with the city telegraph system of Chicago for over 13 years, has resigned his position and opened an office at 623 Western Union Building, where he will do a general consulting and engineering business. Mr. Haskins is one of the few pioneers who started in the business when it was the smallest kind of an infant, and during the time named has watched it grow through all its phases of varied development. That an experience of this kind can not help but be of immense advantage to him in his new sphere goes without saying, and we predict for Mr. Haskins a large and remunerative business. C. E. K.

Niagara Falls Street Railway Conventions.

A delegation of street railway men has been in Niagara Falls arranging for the State convention, which will be held at the International Hotel on September 13, 14 and 15, and the National convention, that occurs on October 19, 20, 21 and 22. Last week T. C. Penington, of Chicago, secretary of the National Association; President Rogers, of Binghamton, and A. F. McCabe, of New York, had a long conference with the Hon. W. Caryl Ely, Capt. J. M. Brinker, Burt Van Horn and Secretary Beardsley of the Chamber of Commerce, and perfected the plans for the meetings.

OBITUARY.

Z. Stout Hall, manager of the Postal Telegraph Company, at Trenton, N. J., died August 16. He was 41 years old, an expert operator, and had been local manager of the American Rapid, Bankers' and Brokers', and the Continental Telegraph companies, before their absorption by the Western Union.

The Lake Charles, La., Ice, Light and Waterworks Company has all preparations completed for the erection of a new, up-to-date brick powerhouse for their electric light plant, at a cost of $12,000. The building will be erected on the company's property in North Ryan street, and will be in operation in about two months. The dimensions will be 65x50 feet, with 20-foot walls and roofed with composition fireproof roofing.

How the Ball Dynamo Was Invented.

[*From the Journal of Electricity.*]

He was a rather crochetty old fellow, and as he bent over his work the shop foreman observed that he was at once the most crabbed and the most interesting man about the works. "Sometimes," said the foreman, "he'll snap your head off if you ask him the most civil question; at other times he'll talk away most agreeably. As for a workman, there's no better in the country and, by the way, he was with Ball when the Ball dynamo was invented."

Here, then, was an opportunity, perhaps, for enlightenment concerning that much-talked-of, that declared-to-be-impossible, that universally derided, yet altogether successful, that so-called "unipolar," Ball dynamo, and the possibility of learning, even indirectly, the views of the inventor, made the irascibility of the old man to be no barrier. Indeed, at the mention of "Ball dynamo," the old man's irritable mien vanished into one of affable retrospection. Plain, unpretentious and straightforward as to the English used, the old mechanic told how the Ball dynamo became a reality and, were the truth known, perhaps the humor of this narrative may relate between its lines, the fact of many an invention that has brought both weal and fame to its originator.

"You want to know how Ball came to invent that dynamo, eh? Well, sir, I'll tell ye," he replied. "It was just this way, and after I'm done tellin' ye, kind o' make up your mind if 'twas invention or what. You see, Ball wa'n't no electrician then. He wor a machinist like me now, and when he brought out his dynamo that everybody laughed at an' said wouldn't work, he was running a machine shop. In them days everybody was building dynamos and he thought he'd build one, too. So he just put up an arc machine with four field coils, 'consequent pole' type they call it, and had the armature shaft run through the yokes parallel with the fields. She worked all right with a few arc lights, but he thought it didn't run enough lamps, so he just run her faster and she run more lamps, then he run her faster yet, and the blamed armature busted.

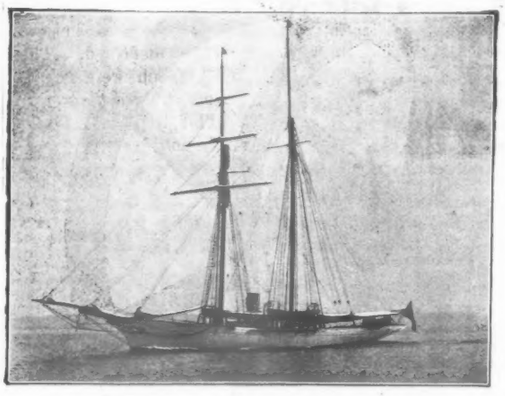
"You see he wa'n't no electrician, he was a mechanic, and when a mechanic has a machine break down on him, he's going to find out the reason why. So he just took that armature and sawed it right through crossways of the shaft, you know, when he see that the inside wires next the core were the ones that got hottest and then he says to himself, says he 'If them blamed wires weren't wrapped on so thick, or if the machine was fixed so as to let the air get at 'em more, she'd be better off. So he makes two armatures and puts 'em on one shaft and lets each armature have two pole pieces so they'll get more air and then let her go, and, I tell ye, she started off fine. Then pretty soon he kept on adding lamps and driving her faster, thinking he'd ought to get more lamps out of her, when up goes both armatures in fire and smoke.

"That was hard luck, but Ball still thought the idea was all right, and we were set to work and made the armatures over new, but before we got the machine put together again something interfered and Ball got kind o' out of the way of tinkering with the electric business and the parts of the machine were left laying around the shop. Finally, one day, maybe six months or a year afterwards, after they had had a directors' meeting and all the directors were standing around the shop talking, one of 'em said, 'Say, Ball, what's the matter with your arc light dynamo that you was going to do so much with?'

"'The dem thing ain't no good, that's what's the matter with it,' says Ball.

"'Why ain't it no good?' says he.

"'Just wait a little while and I'll show you,' says he.



THE AUXILIARY STEAM YACHT "HILDEGARDE."

"Then they all went down to the shop, and Ball told us men to put that dynamo together quick, and we hurried like the Old Nick was after us, and in a little while we had her rolling bully.

"'You see,' says Ball to them directors, 'she'd ought to carry more lamps, but she won't; now watch her.'

"With that, Ball put on more lamps and more steam and she carried 'em. Then he put on some more, and then some more, and I'm blamed if she didn't carry 'em all fine.

"'Gee whillikins,' thought I, 'what's the matter with her anyhow? She never carried so many lamps as that before.' Ball, too, seemed puzzled; then he gave her a look as much as to say, 'I'll bust her anyhow,' and ordered us to slap on another batch of arc lamps and threw the valve wide open. The old machine just tore around like wild, but she carried the lamp all right, though. But, by and by, bang went an armature and the jig was up.

"'There,' says Ball to the directors, 'that's why the dem thing ain't no good.'

"After they was gone, I kept scratching my head and thinking how fine she carried that big load and what a fool Ball was to burn her up because he had told the directors she was no good and didn't like to take water. I felt kind o' bad about it and wandered back to the machine to see how she had busted this time.

"Well, sir, begosh, would you believe me, Ball had hurried us men so in setting up the machine that we plumb forgot and left off one of the pole pieces so that one armature had only one pole piece and the other one had two. And, sir, the armature that was burned out was the one that had the two pole pieces, and when Ball saw it he just said to himself, 'By golly, I'll give each armature only one pole, blamed if I don't'—and he did.

"That was how Ball's dynamo was invented. He didn't know nothing about electricity, nothing at all; he was a mechanic like me, but this machine is a good one, even if it is built in a way that electricians said wouldn't never work."

New England Telephone Company.

President Sherwin, of the New England Telephone and Telegraph Company, says regarding the sale of 10,395 shares of the company's treasury stock offered to stockholders at par: "It was thought better to derive money from the sale of treasury stock for new construction purposes than to increase the company's bonded indebtedness. It is likely that a portion of the money derived from the sale of this stock will be used to take up nearly $500,000 bonds which mature in 1899. A part of these maturing bonds are subject to surrender by the holders and redemption by the company in 1898. The New England Company expends in one form or another, for extensions and new construction, about $500,000 every year. Telephone exchanges grow from year to year within their own limits and a larger amount of connecting lines are needed to keep up the service between the exchanges."

The Suburban Electric Light Company, of Scranton, Pa., gives notice that on September 1 the price of incandescent lights within the city limits will be reduced to five-eighths of a cent per lamp hour, subject to a discount of 10 to 20 per cent (according to the amount of current consumed) if bill is paid on or before the 20th of the month in which the bill is presented.

The Safety Insulated Wire and Cable Company Gives a Yachting Party.

On Wednesday, August 18, about 50 of the friends and customers of the Safety Insulated Wire and Cable Company, of New York city, enjoyed a splendid day on the waters of New York Bay as the guests of Gen. Benjamin M. Whitlock, president, and Mr. Leonard F. Requa, treasurer and general manager of the company. General Whitlock, who is rear commodore of the Atlantic Yacht Club, had placed at the disposal of the company his handsome auxiliary yacht "Hildegarde."

On arrival at the Atlantic Yacht Club's float at Bay Ridge, the naphtha launches and gigs of the "Hildegarde" conveyed the party to the yacht. After an elegant sail down the harbor, during which professional entertainers provided vocal and instrumental music, monologues and stories, the yacht came to anchor between Sandy Hook and the Scotland Lightship. Here the guests were met by a fleet of eight fishing smacks, and those who desired indulged in bluefishing. About 50 bluefish, several flounders and a few sharks were the result of the day's catch.

While the "Hildegarde" was lying at anchor waiting for the fishing party to return, several of the guests discovered a water-spout traveling up the coast. This discovery was not due to the effect of any refreshments served aboard the yacht, as the unbelievers found out by reading the papers the following day, when an account of the damage done by the water-spout was printed. A sharp thunderstorm passed over the yacht while she was lying at anchor, but seemed to have no effect on the electrical men present. About 5 o'clock the fishermen returned to the "Hildegarde," anchor was weighed, and the yacht was put under full speed for the club house, where an elegant dinner was served. Appropriate resolutions were drawn up by the assembled guests and presented to the hosts of the day. The outing of the Safety Insulated Wire and Cable Company will go down in electrical annals as one of the pleasantest ever enjoyed by the craft.

Charging a Plate by X Rays.

G. Nannes, in an article in the *Beiblätter*, states that he finds that if a zinc plate be charged with negative electricity and connected to the needle of a quadrant electrometer, and then subjected to the action of the X rays, the needle will not only return to zero, but will be deflected on the other side. The action of the X rays was found to be inversely proportional to the square of the distance between the plate and the vacuum tube.

It is reported that Henry M. Whitney, with Canadian capitalists, has formed a syndicate for establishing a system of electric railroads in Kingston, Jamaica.

ON THE CATHODE RAYS AND SOME PHENOMENA IN VACUUM TUBES.

BY C. MALTÉZOS, IN "COMPTES RENDUS."

The tubes employed in these experiments were pear-shaped, the electrodes ending in two aluminum disks placed at each end of the tube with their surfaces at right angles to one another. At the anti-cathode is produced a luminous ring with a central spot.

When the disk on the narrow portion of the tube is made cathode, the following are some of the phenomena which are observed:

1. If the tube near the cathode disk be touched with the finger, an attraction of the cathode ray is observed; the glass near the finger becomes more phosphorescent, and the whole cathode beam is deflected towards the hand. It is simultaneously observed that on the anti-cathode ring the phosphorescence becomes stronger near the finger, and that the central spot undergoes a change from a circle to an ellipse, as though submitted to a pressure of which the small axis points towards the finger. The phenomenon also takes place if the tube be touched with one of the armatures of a Leyden jar, the other armature of which is connected to earth; and it appears that every conductor touching the outside of the tube is electrified by influence, and that the negatively charged body is within the tube.

2. If the conducting wire connected between the cathode and the coil is placed near the tube, or in contact with it, the beam is also attracted towards the wire; and if a series of sparks passes between the wire and the tube, the cathode beam is alternatively attracted and returns to its original position. The electrical charge in the wire is also negative; consequently, if the phenomenon were due to electrostatic influence, there would be repulsion. The phenomenon is due to the electromagnetic action between the current which starts from the cathode along the wire and the current of the cathode system.

3. The first phenomenon shows that in the cathode phenomenon there is influence due to electrified matter; the second shows also that this matter travels along the cathode rays, starting from the cathode. The author further discusses the above phenomena at some length.

4. If the anti-cathode system be examined, it is seen to consist of a not very brilliant central spot, and of alternately dark and bright rings; and the same thing is observed on the phosphorescent Roentgen screen.

In order to better examine this phenomenon, the action in an exhausted spherical tube was investigated, in which the electrodes consist of aluminum wires, one being double the length of the other.

When the long wire is used as cathode, there does not appear on the side of the tube an entire phosphorescent zone, of the height equal to the length of the electrode, but bands parallel to the wire, alternately bright and dark. With one of the tubes the author counted more than 20 bright bands.

5. If the strength of the current increases, the diameter of the luminous rings decreases. This phenomenon may be explained by the visibility of new rings with an increase of current (Birkeland's phenomena), or by the increase in the velocity of the cathode rays, and, consequently, by the electro-dynamic attraction of these rays.

FIG. 1.—TESTING ROOM WHERE "PARAGON" FAN MOTORS ARE TESTED.

The "Paragon" Fan Motor.

In view of the very large output of "Paragon" fans for the season of 1897, great credit is due Mr. J. P. Williams, the inventor, who has devoted more than three years of energy in evolving the present form of "Paragon" motor, which is, as may be generally known, the outcome of the "Globe" motor. The principle of the motor is a radical departure in this line of construction. At the present time the factory at Lancaster, Pa., where these motors are made, is employing 280 men, and even with that large complement of workmen the company is having great difficulty in producing fans fast enough for the season's demand. It is the intention of the manufacturers to operate during the entire winter months for the following season; in fact, the sales have been so much greater than even the makers anticipated that the factory equipment of machinery and facilities has been doubled for the past three months, with the result, as Mr. Williams remarked, that "we shall sell over 6,000 'Paragon' fans this season." We present herewith two views in the company's factory at Lancaster.

A NEW PROPERTY OF THE CATHODE RAYS WHICH REVEALS THEIR COMPLETE NATURE.

BY M. H. DESLANDRES IN "COMPTES RENDUS."

In a previous communication (*C. R.*, p. 678, 29th March, 1897), the author published the results of experiments carried out at the Paris Observatory on the mutual action of cathode rays, and bodies placed in the interior of tubes containing rarefied gases.

It was shown that all these bodies, whether conductors or insulators, influence the direction of the cathode rays, if they are anodes and merely insulated. When they are cathodes, or connected to earth, the action is generally stronger and accompanied by repulsion. In the first researches the author observed the following general fact, which he subsequently investigated by special experiments:

When a cathode ray is deflected by a neighboring body, it generally divides itself at the same time into several distinct beams, which are unequally deflected. The secondary rays which were combined in the primary ray are thus separated.

This property of the cathode rays had not hitherto been published. The apparatus employed involves the use of a tube containing two electrodes. One of these consists of a screen pierced with a fine slit; on one side is placed the main cathode, and on the other side of the screen is seen a shadow projected by the screen on the glass, and in the center the brilliant line of the slit.

This curious division of the rays is not merely characteristic to this tube fitted with two cathodes; it takes place also with the disk which constitutes the cathode or ordinary tubes, in the portion of the tube where this disk is connected to the glass by a wire normal to the disk.

The same phenomenon is also observed, under the conditions where the interference surfaces of Jauman and the "summation gebilde" of Wiedemann and Schmidt are found. In the tube employed by the author, the image of the slit in the screen is represented by a line of light at the end of the tube, and if the cathode beam be divided up, a number of less intense and unequally divided lines are observed. If different coils be employed with the same tube, the images of the dispersed lines present differences, but at the same time have points in common.

The greatest deviation of the lines appears at very low pressures.

The author suggests that this division by the action of a neighboring body may be analogous to the action of the magnet in the experiments of Lenard and Birkeland. The want of suitable magnets has prevented the author from ascertaining whether the division of the beam were the same in the two cases. These experiments lead to the following questions: Have the unequally divided rays the same rate of propagation? Are they emitted successively or simultaneously? How does their deviation vary with increasing distances of the cathode? The difficulty of making observations in a vacuum does not allow of an immediate answer. These researches have an interest, not only to physicists, but also to astronomers.

The conditions necessary for the production of cathode rays exist in celestial bodies, and particularly in the solar atmosphere.

The author suggests that the theory of the division of the cathode rays might explain the division of the tail of a comet.

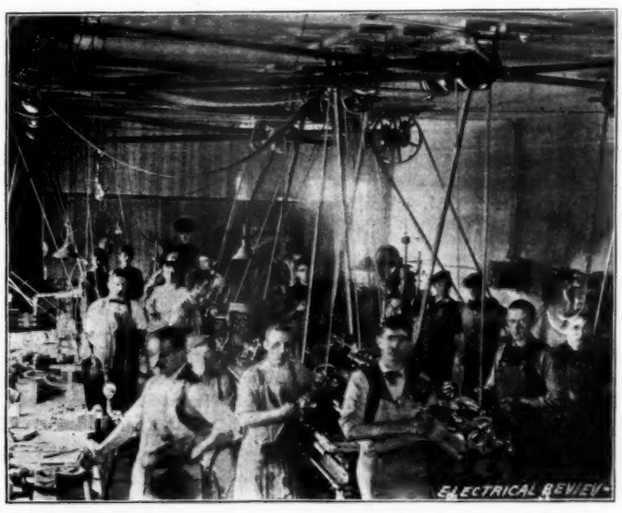


FIG. 2.—MACHINE SHOP WHERE "PARAGON" FAN MOTORS ARE MADE.

Metropolitan Traction Company.

A meeting of the stockholders of the Metropolitan Traction Company, of New York city, has been called for September 14 to pass upon the method resolved on by the directors for winding up the company and distributing its assets. These assets consist of the entire capital stock, $30,000,000, of the Metropolitan Street Railway Company and other property and securities valued at about $6,000,000, which can readily be exchanged or converted into securities capable of distribution. The capital of the Metropolitan Traction Company is of the same amount as that of the street railway company, and each traction stockholder will receive in exchange for his stock an equal amount of the street railway stock, share for share, and in addition further securities to the amount of 20 per cent of the par value of his stock.

ADVANCE INFORMATION

Electric Light and Power.

GAINESVILLE, FLA.—J. M. Graham and H. E. Taylor will establish an electric light plant.

WESTBROOK, ME. — The electric light company is adding improvements to its plant, new machinery, etc.

UPPER SANDUSKY, OHIO—W. J. Hayes & Sons, of Cleveland, have purchased the $10,000 six per cent bonds to be issued by the town of Carey for the purpose of constructing an electric light plant.

ST. PAUL, MINN.—Chairman Daly, of the committee on fuel and lighting of the City Hall and Court House, may give information concerning electric light plant.

DONALDSONVILLE, LA. — George U. Borde, of New Orleans, La., has been engaged to prepare plans and specifications for the contemplated water and electric light works.

CATONSVILLE, MD.—The Catonsville Ice, Light and Power Company has been incorporated by B. N. Baker, Victor G. Bloede, William H. Gorman, Wesley M. Oler, Conway Robinson, Hanson Robinson and Dr. C. G. W. Macgill, to build on the Patapsco River, near Orange Grove, an electric light plant, to cost about $65,000, equipped with the latest improved machinery. Capital stock, $82,000.

LAFAYETTE, LA. — The Consolidated Engineering Company, of New Orleans, La., has been awarded contract for erection of city electric plant.

CHESTER, S. C.—City Clerk may give information concerning construction of electric light plant.

SEATTLE, WASH.—W. D. Wood, Mayor of this place, has purchased a small electric plant, with which he purposes supplying the city of Dawson with light during the winter months.

ATLANTIC CITY, N. J.—A canvass is being made of the city for electric light plant No. 3.

TACKSUPVILLE, PA.—The Tunkhannock Borough Council is about to give a contract to the extent of $900 a year for lighting its streets with electric lights.

ONEIDA, N. Y.—A five-year contract for lighting the streets of this place has been awarded to Charles M. Fellows, Syracuse, N. Y.

SANTA ROSA, CAL.—The trustees of the California Home for the Care and Training of Feeble-Minded Children have let a contract for an electric lighting plant and engine, to cost $8,000.

BEEVILLE, TEX.—C. P. Edison has purchased the outfit of the defunct electric light plant, and contemplates putting in new machinery.

GREENUP, KY.—The electric light plant at this place will soon be in operation. The poles and wires are nearly all placed and the dynamos, engine, and boilers have just arrived.

CLIO, MICH.—The new electric light plant at Clio is completed at a cost of $3,500.

WENONAH, N. J.—The Borough Council of this place has negotiated a contract with the Electric Light Company, located at Reeves's Mills, near Pitman Grove, for lighting the town by electricity, arc lights to be placed on all the thoroughfares.

FREMONT, MICH. — This village has purchased the electric light plant from Mr. Randall. Consideration, $2,850.

FREDONIA, N. Y.—The Board of Trustees have ordered a new dynamo of 60-light power for their electric light plant, and will put in 20 more lights at once. They will also light the City Hall from their own plant instead of from the street railway company.

ATTALLA, ALA.—Messrs. Forman & Langford, who recently leased the electric light and waterworks plant from this city, are adding many improvements to it, and Attalla will soon be one of the best lighted towns in North Alabama.

FRAMINGHAM, MASS.—The Natic Electric Company has the contract to light this place.

OAKLAND, CAL.—The work of extending the electric light system into the annexed district is being pushed forward as rapidly as possible under the direction of City Electrician Carleton.

MILWAUKEE, WIS.—Plans are now being prepared for the extensive addition to be built to the River street power-house of the Milwaukee Electric Railway and Light Company, which will cover the entire ground from Oneida street to the present power building and from River street to the river. The intention of the company is to build and equip one of the finest and most complete electric power plants to be found in the country, the entire improvement to cost about $500,000. Work on the building will begin by October 1.

LAWRENCE, KAS.—The new electric lights are being put in Haskell Institute by the Lawrence company; the poles are being erected so that an electric car line to the school could use them if occasion should ever offer.

ROCHESTER, MINN.—The General Electric Light Company, of New York, has been awarded contract for the erection of $17,200 electric light plant for the State Insane Hospital.

HARTFORD, CT. — The Hartford Electric Light Company has declared a semi-annual dividend of three per cent.

LAMPASAS, TEX.—The Lampasas Electric Light Plant sold at public sale to satisfy a lien for $8,000 held on it by the Southern National Bank, of New York city.

OXFORD, N. Y.—Commercial Gas Light Company has been incorporated by Frank Corwin, Alexander D. Wand, Frederick H. Burchard, Edgar A. Pearsall and Albert S. Burchard. Capital stock, $2,000.

New Electric Railways.

MEADVILLE, PA.—The Meadville Street Railway Company has filed its charter for the construction of a street railway in this place, and extension of the line to Edinboro, via Cambridge Springs. The capital stock of the company is $350,000.

CLEVELAND, OHIO—It is expected that work will be started shortly on the new trolley line from this place to Wooster, and to be known as the Medina and Wooster road.

ROCKPORT, MASS.—The Rockport Street Railway Company contemplates erecting a power-house here in the fall.

WOODBURY, N. J.—It is reported that a trolley road from here to National Park is a certainty. While the road will not be built until next spring, work will soon commence on the road-bed. The road will be independent of the Camden, Gloucester & Woodbury road, although connection will be made with it at some point in this city.

PHILADELPHIA, PA.—Recent movements indicate that the trolley line will shortly be extended up the Bethlehem pike from Chestnut Hill to Flourtown, providing certain property holders will release.

WAYNESBORO, PA. — A party of promoters from Baltimore have been in conference with the township trustees, with the view of acquiring the right of way for a trolley line in Washington township through the Blue Mountains. The object is to connect Pen Mar with the other resorts on the mountain. The line will be about 15 miles in length.

GREENFIELD, MASS.—A controlling interest in the Greenfield & Turners Falls Street Railway has been bought by Greenfield business men. It is probable that at the annual meeting, October 1, Charles E. Dresser, of Leominster, the present clerk and treasurer, will retire, and will be succeeded by F. E. Pierce, the present postmaster at Greenfield.

SHERBROOKE, P. Q.—Messrs. D. G. Loomis & Sons have been awarded the contract for building the street railway company's power-house.

WEST NEWBURY, MASS. — Ten thousand dollar bonds have been given for the completion of seven miles of railway through this town.

ELYRIA, OHIO—Work is rapidly progressing on the new electric railroad from this place to Oberlin.

KANSAS CITY, MO. — The East Fifth Street Electric Railway has filed articles of incorporation with a capital stock of $2,000. Joseph J. Heim holds seven shares, Ferd Heim six, M. G. Heim six, and Clarence Palmer, one.

MADISONVILLE, OHIO—The work on the new electric line is being pushed to completion. President Kilgour promises that cars will be run into the village by September 1.

STAUNTON, VA.—A movement is on foot for the construction of an electric railway from Basic City, to pass through Staunton, and on to Monterey, in Highland County, and then to the West Virginia line.

ALBANY, N. Y.—The Coxsackie & Greenville Traction Company has been incorporated to operate a road from the terminus of the Greene County Traction Company's line in Coxsackie to Greenville and Durham, a distance of 12 miles. The capital is $150,000.

MONTOURSVILLE, PA.—James N. Blackwell, of this place, has been awarded the contract for the stone for the foundation of the power-house of the Montoursville trolley line. Gottleib Waltz, of this city, secured the contract for the entire construction and erection of the building.

New Telephone and Telegraph Companies.

CHARLOTTESVILLE, VA. — The Albemarle Telephone Company will be organized with J. Edwin Wood, president; James F. Harlan, vice-president, and others; to furnish a better and cheaper telephone service to the business men of Charlottesville and the University of Virginia.

ST. PAUL, MINN. — The Northwestern Telephone Exchange Company's stockholders will amend articles of incorporation, increasing capital stock to $3,000,000, divided into 60,000 shares of $50 per share.

HAMPTON, VA.—The Bell Telephone Company has applied for a charter to erect a plant and do a general telephone business in this place.

VICKSBURG, MICH. — The Bell Telephone Company is looking over the ground with a view of putting in a telephone line between Vicksburg and Athens, via Fulton.

CLYDE, OHIO—The new telephone system, which was put in by local capitalists, assisted by Ed. L. Barber, of Toledo, was opened for use a few days ago. There are nearly 100 subscribers, and the 'phones work to perfection.

CATLETTSBURG, KY.—It will be a matter of a few days only until Catlettsburg and Louisa will be connected by telephone.

New Incorporations.

ALBANY, N. Y. — The Empire Electrical Traction Company, to manufacture electrical appliances for traction purposes, has been incorporated. Capital, $100,000. Directors, William W. Doty, William Reinhart and others, of New York city.

JACKSON, MICH. — The Parrish Signal Company has been incorporated, with $100,000 capital, to manufacture the Parrish electric railway signal, which was invented by Homer Parrish.

CHICAGO, ILL. — The Automatic Electric Clock Company has been incorporated with a capital stock of $50,000. A. E. Stilwell, president of the Kansas City, Pittsburgh & Gulf Railroad and of the Missouri, Kansas & Texas Trust Company; T. H. Wickes, E. S. Mosher and A. C. Robinson. Mr. Wickes is vice-president and general manager of the Pullman Palace Car Company.

Kindred.... ...Interests

Armorite interior conduit is extending the field of its popularity to England, where its many points of merit are well appreciated. The Armorite Interior Conduit Company, Pittsburgh, has information on the conduit question to give away.

The Quaker City Electric Company, Philadelphia, have recently increased their facilities for making dynamos and motors by taking additional space in the building in which they have been, but the entrance and office will be at 237-9 Dock street, instead of Carter street, as heretofore.

For 20 years Brush arc machines have been on the market. Lately many of the small machines have been exchanged for the large units, of which 40,000 lights capacity have been sold. The large Brush arc dynamos are made in capacities up to three hundred 2,000-candle-power lights each.

The Upton "Midget" inclosed arc lamp is one of those tasteful creations which popularity seizes upon at first sight. These lamps burn 150 hours, are but 22 inches long, and are designed for use on low and high tension as well as street railway and power circuits. They are made by the Standard Thermometer and Electric Company, of Peabody, Mass.

The High Efficiency of the Diehl propeller or desk fans, as well as their excellent mechanical construction, have made them extremely popular with the trade and among consumers. The Diehl Manufacturing Company, Elizabethport, N.J., make all kinds of direct-current ventilating apparatus, and issue numerous descriptive pamphlets, which may be had on application.

"Imperial Porcelain" has become a synonym for the highest grade product, at least where high-tension transmission insulators are concerned. The excellent record made by the imperial insulators in many of the largest long-distance transmission installations in the United States, especially on the Buffalo–Niagara Falls line, is in itself a guarantee. The Imperial Porcelain Works, of Trenton, N. J., manufacturers of these insulators, will send interesting descriptive circulars on request.

The Ball & Wood Company, 120 Liberty street, New York city, have just issued a remarkably satisfactory catalogue of their automatic cut-off steam engines. As is well known, this company build simple and compound horizontal engines besides the tandem and cross-compound types and vertical engines of all sizes. In this new catalogue all these engines are well illustrated and thoroughly described, the details of construction being especially full. As an example of the high efficiency of the Ball & Wood vertical engine, Mr. William B. Brock, manager of the Edison Electric Illuminating Company of Paterson, N. J., which has in use nine Ball & Wood vertical engines, and has just ordered a tenth of 600 horse-power, states that his company's installation is reaching very close to 300 watts under actual conditions per pound of Buckwheat anthracite coal. Mr. Brock believes that this showing of economy is at least 20 per cent higher than can be shown by any Corliss plant in the United States. He, of course, does not ascribe this high efficiency to the type of engine used alone, but states that a large portion of the glory attained belongs to the engine.

The Mayor and Gas Committee will receive bids to light the City of Waco, on an all-night and also on a moonlight schedule, with 125 to 200 arc lights, 2,000 c.-p., for a term of two to five years. We will also receive bids to install an electric light plant, specifications for which will be furnished by City Engineer on demand. All bids must be accompanied by a $1,000 certified check. We reserve the right to reject any or all bids. The bids will be opened by the Mayor and Gas Committee at 3 P. M., October 7th, 1897.

C. C. McCULLOCH,
Mayor, Waco, Texas.

ATTEST:
R. W. JOBLONOWSKI,
City Secretary.

BIDS WANTED FOR ELECTRIC LIGHTING

ASHEVILLE, N. C., Aug. 12.

Bids for lighting our city are requested as follows:

For furnishing and maintaining one hundred to one hundred and fifty electric arc lights of two thousand (2,000) candle-power each.

The city reserves the right to reject any or all bids.

Bids to be received until September 20, 1897.

GEO. F. SCOTT,
Chairman Special Light Committee.

NOTICE TO BIDDERS.

Notice is hereby given that bids will be received by the Common Council of the City of Niagara Falls up to and including the first day of November, 1897, at 8 o'clock P. M., for the exclusive furnishing of electric arc lights to the City of Niagara Falls for a period of five years from November 1st, 1898, according to specifications on file with the City Clerk.

Each bid shall give the name and address of the bidder, and shall state the price per annum, for which the bidder will furnish each electric arc light of a two thousand (2,000) candle-lamp-power for said term.

The estimated number of arc lights to be furnished is three hundred (300), with the right of the Common Council of the said city to increase or decrease the said number as it may elect during said term.

The successful bidder will be required to enter into contract for the furnishing of said number of electric arc lights as may be required for such term at the price per annum named in its bid and to furnish bond in twenty thousand dollars ($20,000.00) for the faithful performance of said contract.

Each bidder must accompany his bid with a certified check for ten thousand dollars ($10,000.00) as a guarantee that he will enter into contract if the same is awarded to him.

Further information, if desired, will be furnished by the City Clerk upon application.

All bids shall be opened at the meeting of the Common Council to be held Monday, November 1, 1897.

The Common Council reserves the right to reject any or all bids.

Dated August 16, 1897.

By order of the Common Council.
S. F. ARKUSH, *City Clerk.*

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Ask for tickets to New York via B. & O. and save inconvenience.

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Electrical.... Patents.

[Specially reported for this journal by E. S. Duvall, solicitor of patents, Loan and Trust Building, Washington, D. C. Copies of any patent may be secured for 10 cents each.]

ISSUED AUGUST 17, 1897.

588,144 Electric trolley device; S. Harris, Johnstown, Pa.—Consists of a contact-maker movable along a transverse shaft, which engages the conductor when the contact-maker looses engagement therewith, insulating members between the said shaft and the electrical apparatus on the car.

588,145 Electric trolley device and conductor constriction therefor; S. Harris, Johnstown, Pa.

588,170 Method of and apparatus for multiple rate metering for electric currents; E. Oxley, Washington, D. C.

588,176 Electrical railway system; W. B. Purvis, Philadelphia, Pa.

588,177 Application of solar heat to thermo-batteries; H. C. Reagan, Jr., Philadelphia, Pa.—A plurality of standards suitably supported, a frame mounted thereon, and having a mirror or mirrors secured thereto, with thermo-couples suitably supported, and having one set of junctions adapted to be heated by the focusing of the sun's rays from said mirrors and a cooling device at the other set of said junctions.

588,188 Electric contact device; D. S. Shallenberger, Johnstown, Pa.—A contact carrying arm longitudinally movable at its lower end in a fixed horizontal plane, with an upwardly spring-pressed arm pivotally secured to the contact carrying arm and adapted to transmit the upward pressure to the outer end thereof.

588,206 Protective appliance for electrical apparatus; A. S. Williams, Newton, Mass.

588,233 Carbon holder for electric lights; O. S. Moss, Syracuse, N. Y.—Comprises a base having a concavity in its lower face, and provided with lateral ears, means of securing it to the lamp rod, side pieces having eyes in their upper ends, their inner faces adapted to grip the carbon, and means for holding them in engagement with the carbon.

588,246 Combination volt graduator; W. J. Shields, New Wilmington, Pa.

588,258 Switchboard apparatus; W. F. Banks, Milford, Ct.—Consists of a plurality of contact strips, a plurality of contact springs connected thereto, a series of contact strips of greater length than the contact springs and insulated from each other and from the contact strips, a plug, contact plates mounted thereon, contact springs and contact pieces.

588,267 Electric furnace; G. de Chalmot, Leaksville, N. C.—Constructed with an overflow opening, combined with a revolving part arranged beneath it to receive the overflowing material, and means for sprinkling a layer of subdivided material upon said part in advance of the falling upon it of the material overflowing from the furnace.

588,276 Electrolytic process and apparatus therefor; Carl Kellner, Vienna, Austria.

588,279 Direct-current generator; B. G. Lamme, Pittsburgh, Pa.—A direct-current electrical machine having an armature core provided with slots and a winding comprising two sets of coils located in said slots, the sides of the several coils which are short-circuited at the brushes being in separate slots with reference to each other, whereby the self-induction in such coils is reduced.

588,306 Automatic rheostat controller; R. Wilson, Louisville, Ky.—Consists of an actuating lever, a cam moved thereby, a rheostat lever controlled by the cam, and means whereby the actuating lever is permitted to move a short distance independently of the cam.

588,320 Lightning arrester; C. C. Chesney, Pittsfield, Mass.—A series of concentric cylinders having flaring sides, said cylinders being spaced apart throughout their length, suitably insulated supporting means and circuit terminals therefor.

588,382 Electrical conductor; J. D. Bishop, New York, N. Y.—Composed of a plurality of wire ribbons wound side by side longitudinally of the conductor and having intervening air spaces.

588,391 Electric motor truck; G. M. Brill, Philadelphia, Pa.

588,396 Electric railway system; Jean Claret, Paris, France.

588,399 Electric fire engine; G. W. Cox, Stuart, Iowa.

588,405 Smoke-consuming device; W. L. Denlo, Rochester, N. Y.

588,428 Flush switch; Louis Heck, Newark, N. J.

588,435 Railbond for electric railways; V. E. Hunter, Philadelphia, Pa.—Consists of a railroad rail, a split-headed axially and angularly bored coupling bolt, a connecting wire extending through the perforation and bent or coiled once around the bolt, and means for clamping or compressing the bend or coil of the wire firmly against the side of the rail.

588,448 Trolley; Frank Krabal, Pittsburgh, Pa.

588,465 Trolley bicycle; R. T. Oney, Charleston, W. Va.—A trolley driven carriage and its motor, a pedal driving gear, and movable wings or guards for cutting off or permitting access to the pedals.

588,479 Electric herb pad; A. Roedel, New York, N. Y.

588,488 Trolley; G. W. Sell, Johnstown, Pa.

588,489 Magnetic switch lock; S. H. Short, Cleveland, Ohio.

588,490 Brush-holder support for electric generators or motors; S. H. Short, Cleveland, Ohio—Consists of an adjustable rocker mounted concentrically with the commutator, and a plurality of radially adjustable brush holder hangers.

588,491 Multipolar dynamo, motor or rotary transformer; S. H. Short, Cleveland, Ohio—A multipolar dynamo, motor or rotary transformer having a plurality of magnets and a low reluctance magnetic circuit, closed circuit metallic bands or conductors of low electric resistance, inclosing the section of the magnetic circuit at some point in its length outside the armature.

588,511 Transmitter; A. Van Wagenen, Sioux City, Iowa.

588,524 Electrolytic apparatus; E. Balbach, Jr., Newark, N. J.

588,528 Electric railway; R. M. Hunter, Philadelphia, Pa.

588,536 Fuse-block; H. A. Sinclair, Brooklyn, N. Y.—Consists of a body part of insulating material provided with lateral extensions having vertically arranged grooves in their opposite faces, and angular contact pieces provided with means for securing them in said grooves, with fuses joining said contact pieces together in pairs.

588,541 Current conducting rail for electric railways; L. E. Walkins, Springfield, Mass.

WESTERN NEWS NOTES.

Mr. M. B. Austin reports the sale of some 3,000 feet of 20 and 30 conductor safety cables for the use of the fire-alarm department of Chicago. Mr. Austin says orders are now coming in with their old-time regularity.

Mr. J. H. McGill, of McGill & Pomeroy, who has been seriously ill with typhoid fever for some weeks past, has so far recovered as to be up and about, and will shortly be able to attend to business with his usual energy.

H. M. Underwood & Company, Marquette Building, report an active demand for the Duplex Lamp Guard now that the Winter season is close at hand. This guard needs only to be seen to make it apparent that it will take the place of all other forms of lamp protectors.

The Central Electric Company was one of the successful bidders on some supplies for the city, the Western Electric Company securing the balance of the order. While the specifications for city work or supplies are usually very severe, it was an easy matter for the goods of the Central Electric Company to conform to them.

Wilmington, Del., is the latest town realizing its appreciation of the advantages of the Western Telephone Construction Company's apparatus, and showing its being in earnest by ordering an outfit for a 1,000-number exchange of the latest improved pattern. Some half a dozen other towns are also installing Western Telephone Company's apparatus, and the facilities of the factory are taxed to the limit. C. E. K.

Good Telephone Books.

"PRACTICAL INFORMATION FOR TELEPHONISTS,"
BY THOMAS D. LOCKWOOD.
The Telephone Man's Text Book.
192 Pages. Price, $1.00.

"TELEPHONES, THEIR CONSTRUCTION AND FITTING,"
BY F. C. ALLSOP.
Description of Receivers, Transmitters, Switch Boards, Complete Instrument Switches and Switch Boards, Erecting Telephone Lines, Overhead Wires, Instruments, Connecting, Testing for and removing faults.
256 Pages. Illustrated. Price, $2.00.

"TELEPHONE LINES AND THEIR PROPERTIES,"
BY W. J. HOPKINS.
Contents: Design and Construction of City Lines.
Underground Work.
Long Distance Lines.
Wire, Insulators, Exchanges, Switch Boards.
The Propagation of Energy.
The Telephone Current.
Measurement.
Properties of City Lines, Cables, Etc.
Price, $1.50.

"MANUAL OF TELEPHONY,"
BY W. H. PREECE AND ARTHUR T. STUBBS.
Price, $5.50.

"ELECTRIC TELEPHONY,"
BY E. J. HOUSTON AND A. E. KENNELLY.
New. Price, $1.00.

"HOW TO MAKE AND USE THE TELEPHONE,"
BY GEO. H. CARY.
The purpose for which this book is written is to furnish information to those who may desire to construct or use telephones, telephonic apparatus or lines on a small scale.
Price, $1.00.

"TELEPHONE TROUBLES AND HOW TO FIND THEM."
BY C. E. HASKINS.
A practical little treatise for telephone inspectors, exchange managers, and employés who are not electrical experts, as well as the general public, who use telephones or private lines.
Price, 25c.

"THE TELEPHONING OF GREAT CITIES,"
BY A. E. BENNETT.
Price, 50 Cts.

"THE PRACTICAL TELEPHONE HAND BOOK,"
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REFERENCES: "Electrical Review," New York; Paul Cromlein, Teller Lincoln National Bank, Washington, D. C.; Judge Geo. D. Parker, Berkley, Va.; Second National Bank, Washington, D. C.; E. K. Leech, U. S. Mint, Philadelphia, Pa.; W. F. Newell, Manager and Secretary Water Works, Olympia, Oregon.

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